KARNATAK UNIVERSITY, DHARWAD
ACADEMIC (S&T) SECTION
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ
ವಿದ್ಯಾಮಂಡಳ (ಎಸ್&ಟಿ) ವಿಭಾಗ

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NAAC Accredited
'A' Grade 2014

website: kud.ac.in

No. KU/Aca(S&T)/SVB-10/BOS /Computer Science (UG) /20-21/ 994

Date: 16 OCT 2020

NOTIFICATION

Sub: Regarding introduction of the syllabus of Computer Science UG under C.B.C.S. w.e.f. the academic year 2020-21 & onwards.

Ref: 1. UGC Letter DO No. 1-1/2016(SECY), dt. 10.08.2016.
2. Special BOS Res. No. 01, 24.07.2020
3. Special Faculty Res. No. 15, dt. 11.08.2020.
3. Special Academic Council Res. No. 44, dt. 21.08.2020.
4. Vice-Chancellor's order dated – 07 - 10 – 2020

Adverting to the above, it is hereby notified to the Principals of all constituent and affiliated degree colleges coming under the jurisdiction of Karnatak University, Dharwad that the Computer Science UG syllabus for I to VI Semester which is annexed herewith in Annexure-A is introduced under C.B.C.S. from the academic year 2020-21 & onwards.

Hence, the contents of this notification may please be brought to the notice of the students and all the concerned. The prescribed C.B.C.S. syllabus may also be obtained through K.U.website (www.kud.ac.in).

Dharwad: 15/10/2020

(Dr. Hanumantappa K.T)
REGISTRAR

To,

1. The Chairman, BOS Computer Science (UG), Dept. of Computer Science, K.U.Dharwad.
2. The Chairman, Dept. of Computer Science, K.U.Dharwad.
3. The Principals of all the constituted and affiliated degree colleges under the jurisdiction of Karnatak University, Dharwad. (The same may be sent through e-mail)
4. The Registrar (Evaluation), K.U.Dharwad.

Copy fwcs to:

1. Dr. Ch.Ramesh, Dean, Faculty of Science & Tech., Dept. of Botany, K.U.Dharwad.
2. The Director, IT Section, Examination Section, K.U.Dharwad for information and to upload on K.U.Website (www.kud.ac.in).

Copy to:

1. PS to Vice-Chancellor, K.U.Dharwad.
2. S.A. to Registrar, K.U.Dharwad.
3. O.S., Exam UG / Confl / QP / GAD Section, K.U.Dharwad.
4. The System Analysist, Computer Unit Exam Section, K.U.Dharwad.

Annexure "A"

KARNATAK UNIVERSITY

DHARWAD

Regulations and Syllabus

for the Programme

BACHELOR OF COMPUTER SCIENCE (B.Sc.(CS))

(I TO VI Semester)

Revised Syllabus

As Discipline Specific Course (DSC)

Generic Elective (GE) and

Skill Enhancement Course (SEC)

Under

Choice Based Credit System

From 2020-21 and Onwards

Regulations Governing Under – Graduate Programmes in the

Faculty of Science & Technology under Choice Based Credit System

(As per Section 44(1)(c) of K.S.U. Act 2000)

1. TITLE AND COMMENCEMENT

a. These regulations shall be called "Regulations governing the acts of the Choice Based Credit System (CBCS) for under graduate programmes (General)" of Karnatak University, Dharwad.
b. These regulations shall be as per section 44(1)(c) of K.S.U. Act 2000 for introduction of courses.
c. As per Section 44(3) of K.S.U. Act 2000, these Regulations shall come into effect from the academic year: 2020-21 after H.E. the Chancellor's assent.

The sections with titles of Regulations for Under Gradate Programmes (General)

2. UNDER GRADUATE PROGRAMME (U. G. Degree)

Bachelor of Computer Science (**B.Sc.(CS)**) : 06 semesters

3. PROGRAMME STRUCTURE

3.1: B.Sc.(CS) programme shall have three components, Viz., Discipline Specific Courses (DSC), Elective Courses (EC), and Ability Enhancement Courses (AEC) as given in Annexures-1 (Course means subject/paper).

a. DSC: DSC are compulsory core courses of the programme.

b. EC: Elective courses may have three categories' viz., Discipline Specific Elective (DSE) Course, Dissertation/Project and Generic Elective (GE) Course.

    i. DSE: Elective courses offered under the main discipline/subject of study are referred to as Discipline Specific Elective (DSE).

    ii. Dissertation/Project: An elective course designed to acquire special/ advanced knowledge, such as supplement study/support study to a project work, and a candidate study such a course on his/her own with an advisory support by a teacher/faculty member is called Dissertation/project.

c. Ability Enhancement Courses (AEC): The Ability Enhancement Courses (AEC) may be of two kinds: i) Ability Enhancement Compulsory Courses (AECC) and ii) Skill Enhancement Courses (SEC).

   i. Ability Enhancement Compulsory Courses (AECC): Environmental Science, Indian constitution, English Communication and Modern Indian languages (MIL) Communications.

      P.S:. 1) A deaf / spastic /mentally retarded/learning deficiency student shall be exempted from learning any one of the languages like English or MIL.
      2) MIL means any one language mentioned in VIII schedule of Indian Constitution.

   ii. Skill Enhancement Courses (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain theory and lab/hands-on training/ fieldwork.

3.2: Programme shall have two components (L: T/P): i) Lecturing (L) and ii) Tutorial (T) for non practical subjects and Practical (P) for practical subjects. Tutorial consists of participatory discussions, seminar presentations, desk work etc by the students of the respective subjects.

P.S: There shall not be a tutorial for Practical subjects

3.3: Credit system of the programme: B.Sc.(CS) programme shall have 144 credits for 06 semesters. Credit means the unit by which a course is measured.

a. 1 hour lecture or 1 hour tutorial of session per week is equal to 1 credit and that of 2 hours practical is equal to 1 credit. Credit for each course shall be decided by BoS.

b. Course (subject) of 3 to 6 credits each shall be evaluated for 100 marks and that of less than 3 credits including practical shall be evaluated for 50 marks. Further, the project work /dissertation shall have 2 credits and be evaluated for 50 marks.

4: WORKLOAD FOR TEACHERS

4.1: Each theory session may have 40 students extendable to 45 students for B.Sc.(CS) program Irrespective of DSC, DSE, SEC, and AEC in the class rooms.

4.2: There shall be one teacher for first 15 students, 02 teachers up to 27, 03 teachers up to 36 and 4 teachers up to 46 students in a practical batch.

4.3: In general there shall be

i. One hour theory class per week is equal to one hour work load per week.
ii. One hour tutorial per week is equal to one hour work load per week.
iii. One hour practical class per week is equal to one hour work load per week.

5. ADMISSION PROCEDURE FOR B.Sc.(CS) PROGRAMME

5.1: Invitation of Applications: University shall issue a notification for admission to various U G Programmes for all odd semesters soon after declaration of PUC II year / 10+2 results,

a. Notification shall include eligibility for admission to different programmes, detailed fee structure, calendar of academic events for odd and even semesters of the academic year, last date for admission with or without panel fees, remittance of fees to University etc.
b. Admissions shall be purely based on merit cum reservation as per the norms of Government of Karnataka issued from time to time.
c. Academic year normally commences in the month of June every year. Exact date for commencement of academic year shall be decided by the University.
d. Affiliated colleges shall admit the students for each programme not exceeding the approved number of students. Hence, prior approval in this connection from University is mandatory.

5.2: ELIGIBILITY:

A candidate who has passed two years Pre University Course (PUC) Examination conducted by Pre University Board, Government of Karnataka, Bengaluru or 10+2 Examination conducted by CBSE or equivalent examinations by other states or any other recognized Boards / Departments shall be eligible for admission to first semester B.Sc(CS) Programme. Further,

a. For B.Sc.(CS) Programme, a candidate of PUC / 10+2 with Science or equivalent securing minimum of 35% of marks are eligible for admission.

5.3: Admissions for higher Semesters:

a. B.Sc.(CS) Programme shall be carryover system.

b. 75% attendance shall be mandatory for each semester and for each paper to appear for semester end examination. Further, 20% attendance shall be condoned for the students involved in co curricular/ curricular activities through NCC/NSS/ Sports/ Cultural activities/ Study tours/ field work/ attending seminars with the due permission from the Principal in writing.

c. A candidate shall be eligible to move to higher semester even if the candidate passes / fails in such semester end examination conducted by the University.

d. If the candidate fails to appear for the semester end examination but make application to appear for the examination by maintaining 75 % attendance is also eligible to get the admission to immediate next higher semester admission.

   P.S: 1) Mere submission of application by the candidate to appear for examination without maintaining 75% attendance shall not be eligible for higher semester. 2) If candidate maintains 75% attendance but fails to submit the application to appear for semester end examination shall not be eligible for higher semester admission.

e. If the candidate appears for I semester end examination and discontinued for II semester and wishes to take admission for II semester in future, such candidates shall not be allowed for II semester directly. Such candidate shall again get the admission to I semester only by surrendering his/her I semester marks card to University. This is also applicable to other even semesters like IV and VI semesters wherein candidate shall get admission to III semester and V if discontinued to IV and VI semesters respectively.

f. If the candidate appears for II semester end examination and discontinued for III semester and wishes to take admission for IV semester in future, such candidates shall not be allowed for IV semester. Such candidate shall again get the admission to III semester as per University schedule. This is also applicable to other odd semester like V semester wherein candidate gets admission to V semester if discontinued at VI.

g. A candidate who does not satisfy the requirement 75% attendance even in one course (subject / paper) shall not be permitted to take the whole University examination of that semester and he/she shall seek re-admission to that Semester in a subsequent year as per University schedule.

5.4: Medium of instruction: English

5.5: Change of Programme:

Every U. G. Programme is specific in nature and hence, there shall not be any provision to change the programme.

5.6: Change of subject:

The MIL subject studied by the candidate in I semester shall be the same for all other semesters and hence, there shall not be any provision to change the MIL subject.

5.7: Change of College/ Transfer

a. Candidate shall be permitted for change of college only for the odd semesters by admitting within the stipulated period mentioned in the admission notification

with the due consent from both the colleges. There shall not be any provision for transfer / change of college for even semesters. Further, lower semester examination failure / MPC candidates are not eligible for transfer / change of college within the Karnatak University's affiliated colleges.

b. The same shall be applicable for the candidate seeking transfer from the colleges of other University within or outside the state or country by producing the eligibility certificate issued by Karnatak University with the confirmation of similarity of the programmes with each other. Other conditions shall be same as in 5.7(a).

c. Such transfer of admission shall be within the intake capacity of the respective class/ subject of the respective College.

6: EXAMINATION

6.1: Course (subject) of 3 to 6 credits each shall be evaluated for 100 marks and that of less than 3 credits including practical shall be evaluated for 50 marks. Further, the project work /dissertation shall have 6 credits and be evaluated for 100 marks.

6.2: There shall be a continuous assessment mode for the student. For this purpose, semester examinations are divided in to two components viz.,

a. Internal assessment written examinations conducted at college level for 20% of maximum marks allotted for each course (paper/subject) and

b. Semester end written examination conducted by University after 16th week of the commencement of every semester for 80% of maximum marks allotted for each course (paper/subject).

6.3: Internal assessment (IA) examinations:

a. **Theory Papers:** The College shall conduct IA examination for theory subjects in the 8th week for 10% and 12th week for remaining 10% of maximum marks allotted for each paper/subject. Duration of examination shall be 1hr. each.
b. **Practical:** The College shall conduct IA examination for practical paper in the 14th week for 20% of maximum marks allotted for each paper/subject. Duration of examination shall be 3hr.

c. **Project work /dissertation:** The College shall conduct IA examination for Project work /dissertation in the 14th week for 20% of maximum marks allotted for each Project work /dissertation. Duration of examination shall be 1hr.

d. Concerned teacher shall display the marks on notice board within 4 days after IA examination and allow the student for verification of IA Booklet if he wishes.

Grievances, if any, shall be solved by the concerned teachers, further if any by the Principal/ representative of Principal as per internal mechanism of the College.

e. There shall not be any provision for makeup examination for IA examinations for improvement of IA marks or for remaining absent. However, IA exam shall be conducted for the students who remained absent due to participation in the events related to co curricular / curricular activities conducted by recognized organizations.

f. College shall submit the IA marks to the University if student satisfies 75% attendance in the semester and shall be eligible to appear for semester end examination.

6.4: Semester end examination:

Semester end examination shall be conducted by University after 16th week of the commencement of every semester for 80% of maximum marks allotted for each paper. Further, the University shall conduct the semester end examination of the respective semesters only; may be odd or even but not both odd and even semesters simultaneously unless specified otherwise.

a. Duration of theory examination shall be 03 hours for 100 marks subject/ paper/ course (including IA marks) having the credit 3 to 6.

b. Duration of theory examination shall be 1.5 hours for 50 marks subject /paper / course(including IA marks) having the credit less than 3.

c. Duration of practical examination shall be 3 hours for 50 marks subject /paper / course(including IA marks) having the credit less than 3.

d. BoS in consultation with the concerned faculty shall decide the pattern of question paper for uniformity for all the core courses and elective courses.

e. Question papers shall be prepared by team of members of respective Board of Examiners (BoE).

f. Concerned BoE shall decide the scheme of valuation of both theory and practical course papers.

g. There shall be a single valuation for theory papers from the members of concerned BoE under the supervision of moderator who is in turn under the supervision of Chairman of BoE.

h. Practical / evaluation of project / dissertation work shall be conducted before the commencement of theory examination at the concerned colleges by two examiners; one from the same college as internal examiner and other from other colleges appointed by University as external examiner. Further, there may be two external examiners but not two internal examiners to conduct the examination. A

pair of examiners shall conduct practical examination for two batches par day having maximum 12 students in each batch.

6.5: Passing criteria

a. Candidate has to score 40% in each course (subject) including the IA marks for passing the course (subject) subject to the condition that:

   i. No minimum marks or separate passing for the IA examination, but candidate has to score minimum 40% from the semester end examination for its 80% of the maximum marks and fulfils the minimum 40% for maximum marks of the course (subject)(Ex. for 100 marks paper; 20 IA + 80 sem end exam and hence, minimum 32 marks for sem end exam). If candidate scores 40% by cumulating marks from IA and semester end examination but fails to score 40% from the semester end examination, such candidate shall be declared fail.

   ii. If the course (subject) is having both theory and practical, candidate has to pass both theory and practical independently. If the candidate fails in Practical and passes in theory examination, such candidate shall reappear for practical examination only and vice versa.

   iii. In all cases of failure in particular course (subject), IA marks shall be protected and carried forward; and the candidate need not reappear for IA examinations in such cases.

b. On successful scoring of minimum 40% in all courses (Subject), the candidate shall be declared pass in the programme in that semester.

c. On successful scoring of minimum 40% in all courses (Subject) and all the semesters, the candidate shall be declared pass in the entire programme.

6.6: Percentage and Grading

a. If P is the percentage of marks secured (IA + semester end score) by the candidate in a course(subject) which is rounded off to the nearest integer, the grade(G) earned by the candidate in that course(subject) will be given as below:

Percentage(P)	Grade(G)	Percentage(P)	Grade(G)
40 – 49	5.0	75 – 79	8.0
50 – 59	6.0	80 – 84	8.5
60 – 64	6.5	85 – 89	9.0
65 – 69	7.0	90 – 94	9,5
70 – 74	7.5	95 – 100	10.0

Grade point of less than 5 shall be considered as fail in the course (subject). Hence, P=0 and G=0 for the absent also.

b. A student's level of competence shall be categorized by grade point (GP), Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) of the programme.

c. Semester Grade Point Average (SGPA): The SGPA is a ratio of sum of the number of Credit grade points scored from all the courses (subject) of given semester to the total credits of such semester in which the candidate studied. (Credit grade points of each course (subject)= Credit x GP)

d. Cumulative Grade Point Average (CGPA): It is calculated as below for 6 semester programme.

$$CGPA = \frac{\{(Credit_1 * SGPA_1) + (Credit_2 * SGPA_2) + (Credit_3 * SGPA_3) + (Credit_4 * SGPA_4) + (Credit_5 * SGPA_5) + (Credit_6 * SGPA_6)\}}{\text{Total credits of programme (sum of credits of all semesters)}}$$

e. After studying and passing all the credits prescribed for the programme the degree shall be awarded with CGPA score and class distinguishing as second class, first class, and distinction along with grade letter as under.

CGPA of the Programme (UG)	Class Obtained	Grade Letter
9.50 to 10.00	Distinction	A++
9.00 to 9.49		A+
8.00 to 8.99		A
7.00 to 7.99	First Class	B+
6.00 to 6.99		B
5.00 to 5.99	Second Class	C
Less than 5.00	Fail	D

6.7. CRITERIA FOR AWARD OF DEGREE

On successful scoring of minimum 5 grade points in all courses of the programme, the respective degree shall be awarded for the candidates. The University shall issue the final grade card (Marks card) consisting of grade points along with marks of all courses successfully completed, SGPA for all the semesters, CGPA with Grade letter of the entire programme and Class obtained.

The degree shall be awarded in the Annual / Special convocation. The Degree certificate shall consist of CGPA of the programme and Class obtained.

6.8: Recounting, revaluation, challenge valuation, photo copying of answer papers

There shall be provision for recounting of marks, revaluation, challenge valuation and photo copying of answer papers. The University shall invite applications for such

purpose immediately after announcing the results for every semester by giving 10 days time to apply for the same online as per the existing ordinance and regulations and process the same accordingly.

6.9: Rank and Gold medals.

Students shall be considered for Ranks and/or Gold medals for only those who are completing all the credits in 6 semesters (6 semesters Programme) without break in the examination. However, this is not applicable for the award of classes like, second/first class/ distinction to the students.

6.10: Makeup Examination.

a. There shall be no immediate makeup examination for all semesters to the courses where candidate failed to score minimum 40% for semester end examination unless specified otherwise as in (c).
b. However, such candidate shall appear for examination during the regular schedule of examination conducted by the University.
c. There shall be a makeup examination for the V and VI semesters immediately after declaring the final semester results of the programme.

7: Provision for improvement of the marks (Grade Point)

Improvement of the marks (Grade Point): There shall be a provision for candidates to reappear for the examination for the concerned course of theory papers only (subject) in which candidate wishes for improvement of his/ her grade point of SGPA in general and CGPA in total of the programme subject to the condition that:

a. The candidate shall be eligible to reappear for improvement of grade points only after successfully passing the programme.

b. The candidate may opt for the examination for any number of courses (subject / paper) of the programme for improvement of grade point but not more than three times for each course (subject / paper) as per the prevailing syllabus of the examination conducted in the regular schedule of University examinations.

c. All such provisions are there within 03 years from successful completion of the programme but not exceeding the period of double the duration of completion of the programme.

d. In all such cases grade points are considered if there is a progress in such improvements, otherwise original grade points shall be retained.

e. No such candidates shall be eligible for the award of Rank, Gold Medal, Cash Prize, etc.

8: Duration for completion of the U. G. Programme

Minimum duration for completion of B.Sc.(CS) UG Programme shall be 3 years from the date of admission to I semester, but the maximum duration shall be 6 years, i.e., double the duration of programme.

9: REPEAL AND SAVINGS FOR UG PROGRAMMES

All the existing Regulations governing three years Bachelor degree programme in the discipline of Science under semester or any ordinances or regulations or guidelines issued or adopted earlier by the University in this matter for constituent and affiliated colleges of Karnatak University are hereby repealed. However, the above Regulations shall continue to be in force for the students who have been admitted to the degree programme concerned before the enforcement of these new regulations.

Provided that the said repeal shall not affect the previous operation of the said regulations / ordinances or anything duly done or suffered there under or affect any right, liability or obligation acquired, accrued or incurred under the said regulations.

10: Removal of Difficulties:

Any issue not specifically mentioned in these Regulations shall be decided by the Vice Chancellor as per K.S.U 2000 Act.

B.Sc.(CS) Programme structure under CBCS

Semester	*Core			Elective			Ability Enhancement Course						Total Credits
	DSC			**DSE			SEC			AECC			
	Course	L+T+P	Credit	Course	L+T+P	Credit	Course	L+T+P	Credit	Course	L+T+P	Credit	
I	DSC-1A	4+0+4	4+2=6							English-1	2+1+0	2+1=3	26
	DSC-2A	4+0+4	4+2=6							MIL-1	2+1+0	2+1=3	
	DSC-3A	4+2+6	4+2=6							ENVIRONMENTAL SCIENCE	2+0+0	2+0=2	
II	DSC-1B	4+0+4	4+2=6							English-2	2+1+0	2+1=3	26
	DSC-2B	4+0+4	4+2=6							MIL-2	2+1+0	2+1=3	
	DSC-3B	4+2+0	4+2=6							CONSTITUTION OF INDIA	2+0+0	2+0=2	
III	DSC-1C	4+0+4	4+2=6							English-3	2+1+0	2+1=3	26
	DSC-2C	4+0+4	4+2=6							MIL-3	2+1+0	2+1=3	
	DSC-3C	3+1+0	3+1=4										
	DSC-4C	3+1+0	3+1=4										
IV	DSC-1D	4+0+4	4+2=6							English-4	2+1=0	2+1=3	26
	DSC-2D	4+0+4	4+2=6							MIL-4	2+1=0	2+1=3	
	DSC-3D	3+1+0	3+1=4										
	DSC-4D	3+1+0	3+1=4										
V	DSC-1E	4+0+2	4+2=6	DSE-1E	3+1+0	3+1=4	SEC-1E	0+0+4	2				20
				DSE-2E	3+1+0	3+1=4							
				DSE-3E	3+1+0	3+1=4							
VI	DSC-1F	4+0+2	4+2=6	DSE-1F	3+1+0	3+1=4	SEC-1F	0+0+4	2				20
				DSE-2F	3+1+0	3+1=4							
				DSE-3F	3+1+0	3+1=4							
TOTAL			88			24			04			28	144

L+T+P= Lecturing in Theory + Tutorial + Practical Hours per Week (no tutorial for practical subject).

* Each semester may have more than three core (DSC) subjects but not exceeding 18 credits for each semester.

** Each DSE shall have at least two papers and student shall choose any one paper from each DSE.

Bachelor of Computer Science (B.Sc.(CS)) Programme structure under CBCS; Effective from 2020-21

SYLLABUS

SEMESTER - I

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
AECC	B.Sc.(CS)-1.1	English – 1	3	3	45	3	20	80	100
AECC	B.Sc.(CS)-1.2	MIL -1	3	3	45	3	20	80	100
AECC	B.Sc.(CS)-1.3	Indian Constitution	2	2	30	1.5	10	40	50
DSC	B.Sc.(CS)-1.4	Problem Solving Technique using C-Programming	4 + 0	4	48	3	20	80	100
DSC	B.Sc.(CS)-1.5	Computer Oriented Numerical Methods	4 + 0	4	48	3	20	80	100
DSC	B.Sc.(CS)-1.6	Introduction to Linux	4 + 2	6	48	3	20	80	100
DSC	B.Sc.(CS)-1.7	C-Programming LAB	2	4	48	3	10	40	50
DSC	B.Sc.(CS)-1.8	Numerical Methods LAB	2	4	48	3	10	40	50
	Total		26	30			130	520	650

SEMESTER - II

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
AECC	B.Sc.(CS)-2.1	English – 2	3	3	45	3	20	80	100
AECC	B.Sc.(CS)-2.2	MIL -2	3	3	45	3	20	80	100
AECC	B.Sc.(CS)-2.3	Human Rights & Env. Studies	2	2	30	1.5	10	40	50
DSC	B.Sc.(CS)-2.4	Probability & Statistics	4 + 0	4	48	3	20	80	100
DSC	B.Sc.(CS)-2.5	OOP with C++	4 + 0	4	48	3	20	80	100
DSC	B.Sc.(CS)-2.6	Discrete Mathematical Structure	4 + 2	6	48	3	20	80	100
DSC	B.Sc.(CS)-2.7	Statistical Methods LAB	2	4	48	3	10	40	50
DSC	B.Sc.(CS)-2.8	C\PP Lab	2	4	48	3	10	40	50
	Total		26	30			130	520	650

SEMESTER - III

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
AECC	B.Sc.(CS)-3.1	English - 3	3	3	45	3	20	80	100
AECC	B.Sc.(CS)-3.2	MIL – 3	3	3	45	3	20	80	100
DSC	B.Sc.(CS)-3.3	Data Structures using C	4 + 0	4	48	3	20	80	100
DSC	B.Sc.(CS)-3.4	Microprocessor 8085	4 + 0	4	48	3	20	80	100
DSC	B.Sc.(CS)-3.5	Fundamentals of Digital Electronics	3 + 1	4	48	3	20	80	100
DSC	B.Sc.(CS)-3.6	Data Communications	3 + 1	4	48	3	20	80	100
DSC	B.Sc.(CS)-3.7	Data Structures Lab	2	4	48	3	10	40	50
DSC	B.Sc.(CS)-3.8	Microprocessor Lab	2	4	48	3	10	40	50
	Total		26	30			140	560	700

SEMESTER - IV

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
AECC	B.Sc.(CS)-4.1	English - 4	3	3	45	3	20	80	100
AECC	B.Sc.(CS)-4.2	MIL – 4	3	3	45	3	20	80	100
DSC	B.Sc.(CS)-4.3	Data Base Management System	4 + 0	4	48	3	20	80	100
DSC	B.Sc.(CS)-4.4	JAVA Programming	4 + 0	4	48	3	20	80	100
DSC	B.Sc.(CS)-4.5	Operation Research	3 + 1	4	48	3	20	80	100
DSC	B.Sc.(CS)-4.6	Software Engineering	3 + 1	4	48	3	20	80	100
DSC	B.Sc.(CS)-4.7	DBMS LAB	2	4	48	3	10	40	50
DSC	B.Sc.(CS)-4.8	Java LAB	2	4	48	3	10	40	50
	Total		26	30			140	560	700

SEMESTER - V

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
DSC	B.Sc.(CS)-5.1	Web Technologies	4 + 0	4	48	3	20	80	100
*DSE	B.Sc.(CS)-5.2	Core Elective – I	3 + 1	4	48	3	20	80	100
*DSE	B.Sc.(CS)-5.3	Core Elective – II	3 + 1	4	48	3	20	80	100
*DSE	B.Sc.(CS)-5.4	Core Elective – III	3 + 1	4	48	3	20	80	100
SEC	B.Sc.(CS)-5.5	Mini Project - I	2	4	48	3	10	40	50
DSC	B.Sc.(CS)-5.6	Web Designing LAB	2	4	48	3	10	40	50
	Total		20	24			100	400	600

***Note:** Each DSE shall have three papers, Student shall opt any one paper from each DSE

List of Core Elective - I

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	B.Sc.(CS)E – 5.2 A	Management Information System
2	B.Sc.(CS)E – 5.2 B	Managerial Economics
3	B.Sc.(CS)E – 5.2 C	Decision Support System

List of Core Elective - II

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	B.Sc.(CS)E – 5.3 A	Computer Graphics
2	B.Sc.(CS)E – 5.3 B	Computer Networks
3	B.Sc.(CS)E – 5.3 C	Object Oriented Analysis & Design

List of Core Elective – III

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	B.Sc.(CS)E – 5.4 A	Artificial Intelligence
2	B.Sc.(CS)E – 5.4 B	Introduction to Machine Learning
3	B.Sc.(CS)E – 5.4 C	Internet of Things (IoT)

SEMESTER - VI

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
DSC	B.Sc.(CS)-6.1	Python Programming	4 + 0	4	48	3	20	80	100
*DSE	B.Sc.(CS)-6.2	Core Elective – I	3 + 1	4	48	3	20	80	100
*DSE	B.Sc.(CS)-6.3	Core Elective – II	3 + 1	4	48	3	20	80	100
*DSE	B.Sc.(CS)-6.4	Core Elective – III	3 + 1	4	48	3	20	80	100
SEC	B.Sc.(CS)-6.5	Mini Project – II	2	4	48	3	10	40	50
DSC	B.Sc.(CS)-6.6	Python Programming LAB	2	4	48	3	10	40	50
	Total		20	24			100	400	600

***Note:** Each DSE shall have three papers, Student shall opt any one paper from each DSE

List of Core Elective - I

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	B.Sc.(CS)E – 6.2 A	Data Mining
2	B.Sc.(CS)E – 6.2 B	Mobile Communications
3	B.Sc.(CS)E – 6.2 C	Design and Analysis of Algorithms

List of Core Elective - II

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	B.Sc.(CS)E – 6.3 A	Computer Vision
2	B.Sc.(CS)E – 6.3 B	Cyber Security
3	B.Sc.(CS)E – 6.3 C	Network Security

List of Core Elective - III

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	B.Sc.(CS)E – 6.4 A	Mobile Applications
2	B.Sc.(CS)E – 6.4 B	Cloud Computing
3	B.Sc.(CS)E – 6.4 C	System Programming

SEMESTER - I

B.Sc.(CS)-1.1-AECC-1: ENGLISH-1

(English-I – Syllabus is decided by respective BoS)

B.Sc.(CS)-1.2- AECC-2: MIL-1

(MIL – Syllabus is decided by respective BoS)

B.Sc.(CS)-1.3- AECC-3: INDIAN CONSTITUTION

(Indian Constitution – Syllabus is decided by respective BoS)

B.Sc.(CS)-1.4 - DSC-1A: PROBLEM SOLVING TECHNIQUE USING 'C' PROGRAMMING

Total: 48 Hrs

UNIT 1:

Computer Concepts: Block diagram of computer system, Central Processing Unit(CPU), ALU, CU, Main memory, Input/Output Unit, **Input devices:** Keyboard, Mouse, Light pen, Joystick, Scanner, Digitizer. **Output devices**: Various types of printers, Plotters, **Software:** System software, Operating System, Application Software, Machine level language, Assembly language, high level programming, Assemblers, compilers and editors, Merits and demerits of all the languages.

(4 Hrs)

UNIT 2:

Computer Programming: Basics Programming concepts- Algorithm, Flowchart. **Overview of C:** Introduction, Importance of C, Sample 'C' programs, Basic structure of C programming, Programming Style, Executing a 'C' program **Data Types in C:** C tokens, Keywords, Identifiers, Constants, Variables, Data types, Declaration of variables, Assigning values to variables, Defining symbolic constants, Simple Programs.

Input and Output statements: Input and Output statements, Reading character, Writing character, formatted input, formatted output statements**.**

(13 Hrs)

UNIT 3:

Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and Decrement operators, Conditional operators, Bitwise operators, Special operators, Type Conversion in expressions, Operator precedence,

Mathematical functions**. Branching and Looping:** Simple 'if' statement, Simple, Nested, Ladder 'if–else' statement. The 'Switch' statement, The ?; operator, GOTO statement, The 'While' statement, 'do-while' statement, 'for' statement, Simple programs on branching and looping.

(11 Hrs)

UNIT 4:

Arrays: Introduction, One dimensional, Two dimensional and Multi dimensional arrays, Initialization of arrays, **Handling of Character Strings:** Declaring and Initializing string variables, reading string from terminal, writing string to screen, Arithmetic operations on characters, putting strings together, Comparison of two strings, **string handling functions:** strlen, strcpy, strcat, strcmp.

(8Hrs)

UNIT 5:

Functions: Definition of function. Return values and their types, Function calls, Function declaration, Categories of function explanation with example, Nesting of function, Recursion, Faction with arrays. **Structure and Union:** Introduction, Defining Structure, declaring structure variables and structure members, arrays as structure, arrays within structure, Union. Pointers: Understanding Pointers, Accessing the address of variables, Declaring and initializing pointers, Accessing a variable through its pointers.

(12 Hrs)

Text Books:

1. Balaguruswamy: Programming in ANSI C, Tata Mc Graw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie: The C Programming Language, PHI

Reference:

1. V. Rajaraman: Fundamentals of Computers, PHI(EEE).
2. Kamthane, Programming with ANSI and Turbo C, Pearson Education, Asia.
3. Herbert Schildt: C. The complete reference, 4th edition.
4. Yeshwant Kanetkar: Let us C, BPB Publications.
5. Rajesh Hongal: Computer Concepts and C Programming.

B.Sc.(CS) 1.5-DSC-2A: COMPUTER ORIENTED NUMERICAL METHODS

Total: 48 Hours

UNIT 1:

Solution of Equations(Polynomial and Transcendental equations): Interval Halving Methods, Secant Methods, Regular Falsi Method, Newton's Raphsons Methods, Find Point Iteration Methods, Muller's Method.

(10 Hrs)

UNIT 2:

Solutions of system of Linear Equations: Gaussian Elimination Method, Gauss Iteration Method, Gauss-Jordan, Gauss-Jocobi, Gauss-Siedal Iterative Methods, LU Decomposition Method, Eigen Value and Eigen Vector of a Matrix.

(12 Hrs)

UNIT 3:

Finite Differences: Forward Difference, Backward Differences & Central Differences & operations, Interpolation for Equal Intervals, Newton's Forward Interpolation Formula, Newton's Backward Interpolation Formula, Central differences formula-Gauss forward and backward formula Stiriling's formula ,Bessel's formula, Lagrange Interpolation, Curve fitting by least Squares Method.

(15 Hrs)

UNIT 4:

Numerical Differentiation and Integration: Derivative using Newton's Forward Difference Formula, Derivative using Newton's Backward Difference Formula, Derivative using Sterling's formula, Maxima and Minima, Numerical Integration :General Quadrature formula, Trapezoidal Rule,simpsom's $1/3^{rd}$ Rule, Simpsons $3/8^{th}$ Rule, Weddle's Rule,Euler-Maclaurin summation formula.

(11 Hrs)

Text Books:

1. **"**Numerical Methods", Dr. P.Kandasamy and Dr. K Gunavati, S Chand & Co Ltd, India.
2. "Elementary engineering mathematics" B.S Grewal. Khanna Publisher.

Reference Books:

1. **"**Introductory Methods of Numerical Analysis", 5^{th} edition, S Sastry, PHI.
2. "Numerical Methods for Science and Engineering Computation", M.K. Jain, S.R.K. Iyengar, Wiley Eastern Limited.

B.Sc.(CS)-1.6- DSC-3A: INTRODUCTION TO LINUX

Total: 48 Hrs

UNIT 1:

Introduction to Unix: Brief History, What is Unix?, Unix Components, Using Unix, Commands in Unix, Some Basic Commands, Getting Help, Command Substitution, Giving Multiple Commands, Aliases.

(8 Hrs)

UNIT 2:

Files and File Organization: Unix Files, Categories of Files, Hidden Files, File System, Path Names, Home Directory, Directory Commands, File Related Commands, Wild Cards, Displaying the Contents of a File, Printing of Files, Comparing Files.

File Attributes and Permissions: Ownership of Files, File Attributes, File Command, Changing File Permission, Changing the Owner of a File, Changing the group of a File, Times Associated with a File, umask Command.

(10 Hrs)

UNIT 3:

The vi Editor: vi Editor, Editing with vi, Moving the Cursor, Editing, Copying and Moving Text, Pattern Searching, Repeating the Last Editor Command, Undoing Commands, Joining Lines, Writing Selected Lines onto a Separate File, Using the Shell from vi, Configuring the vi Environment.

(10 Hrs)

UNIT 4:

Regular Expressions: grep Family of Commands and sed : Regular Expressions, grep Family, egrep Command, fgrep Command, Stream Editor-sed.

(5 Hrs)

UNIT 5:

Shell Programming : Shell Variables, export Command, .profile File – A Script Run during Starting, The First Shell Script, read Command, Positional Parameters, The $? Variable – Knowing the Exit Status, More about the set Command, exit Command, Branching Control Structures, Loop-Control Structures, continue and break Statements, expr Command, Real Arithmetic in Shell Programs, The here Document (<<), sleep Command, Debugging Scripts, script Command, eval Command, exec Command.

(15 Hrs)

Text Books:

1. M.G.Venkateshmurthy: Introduction to Unix & Shell Programming, Pearson Education

Reference Books :

1. John Goerzen: Linux Programming Bible, IDG Books, New Delhi.
2. Sumitabha Das: Your Unix - The Ultimate Guide, TMH.
3. Richard Petersen: The Complete Reference – Linux, McGraw-Hill
4. Yashwant Kanetkar: Unix & Shell programming – BPB

B.Sc.(CS)-1.7- DSC-1A (Pr): C- PROGRAMMING LAB

Programs:

1. Write a C program to find the area of a circle given radius.
2. Write a C program to find the area of a triangle given three sides.
3. Write a C program to calculate simple interest and compound interest.
4. Write a C program to convert temperature in Fahrenheit to Celsius and Celsius to Fahrenheit.
5. Write a C program to find the GCD and LCM of two integer numbers.
6. Write a C program to check whether the given integer is even or odd using if condition statement.
7. Write a C program to accept two integers and determine in which quadrant it lies using if ladder.
8. Write a C program to simulate a simple calculator with addition, subtraction, multiplication, division and it should display the error message for division for 0 using switch case.
9. Write a C program to print number from 100 to 200 which are divisible by 7 and display their sum and count using for loop.
10. Write a C program to reverse a given integer number and check whether the number is palindrome or not using while loop.

11. Write a C program the pattern given below using nested for loop

12. Write a C program to read N integers (zero, positive and negative) into an array and find sum of positive numbers, sum of negative numbers and average of all numbers.
13. Write a C program to find the addition and subtraction of two matrices.
14. Write a C program to calculate the factorial of a number using function.
15. Write a C program to find if a character is alphabetic or numeric or special character.
16. Write a C program to count the number of vowels, consonants and special characters in a given sentence.
17. Write a C program to accept a sentence and convert all lowercase letters to uppercase letters and vice-versa.
18. Write a C program to find the length of a string using user defined function.
19. Write a program to accept different goods with the number, price and date of purchase, finally display them (using structure).
20. Write a C program to implement array using pointers.

Note: All programs should be carried out on UNIX/LINUX platform

B.Sc.(CS)-1.8- DSC-2A (Pr): NUMERICAL METHODS LAB

Programs:

1. Program to interchange primary and secondary diagonal elements of a square
2. Program to find the row sum, column sum, primary diagonal sum and secondary diagonal sum of a matrix.
3. Program to check whether the given matrix is singular or not.
4. Program to find the addition, subtraction and multiplication of two matrices using functions
5. Program to accept a square matrix and determine whether it is an identity matrix or not.
6. Program to find the root of the equation using Bisection Method.
7. Program to find roots of an eqn f(x) = 0 using Regular-Falsi Method.
8. Program to find the root of the equation using Newton Raphson Method.
9. Program to solve the system eqn Ax = B using Gauss Elimination Method.
10. Program to solve the system eqn Ax = B using Gauss Jacobin Method.
11. Program to solve the system eqn Ax = B using Gauss Seidel Method.
12. Program to find integral of a function using Trapezoidal rule.
13. Program to find integral of a function using Simpson's $1/3^{rd}$ rule.
14. Program to find integral of a function using Simpson's $3/8^{th}$ rule.

Note: All programs should be carried out on UNIX/LINUX platform

SEMESTER - II

B.Sc.(CS) 2.1-AECC-4: ENGLISH-2

(English – Syllabus is decided by respective BoS)

B.Sc.(CS) 2.2-AECC-5: MIL-2

(MIL – Syllabus is decided by respective BoS)

B.Sc.(CS) 2.3-AECC-6: HUMAN RIGHTS AND ENVIRONMENTAL STUDIES

(HR & ES – Syllabus is decided by respective BoS)

B.Sc.(CS) 2.4-DSC-1B: PROBABILITY & STATISTICS

Total: 48 Hours

UNIT 1:

Introduction: Meaning and scope, origin and development of statistics, definition of statistics, importance and scope of statistics, limitations of statistics, distrust of statistics.

Collection of Data: Introduction ,objectives and scope of enquiry, statistical units to be used, source of information(Data),methods of data collection, degree of accuracy aimed at in the final results, types of enquiry, primary and secondary data, choice between primary and secondary data, methods of collecting primary data, direct personal investigation, indirect oral investigation, information received through local agencies, mailed questionnaire method, schedules sent through enumerators, drafting or framing the questionnaire, sources of secondary data, published sources, unpublished sources, precautions in the use of secondary data.

(13 Hrs)

UNIT 2:

Classification and tabulation : Introduction, classification, functions of classifications, rules for classifications, basis of classifications, frequency distributions, array, discrete or ungrouped frequency distribution, grouped frequency distribution, continuous frequency distribution, basic principles for forming a grouped frequency distribution, types of classes, number of classes, size of class intervals, cumulative frequency distribution, less then cumulative frequency, more than cumulative frequency, bivariate frequency distribution, tabulation-meaning and importance, parts of a table, requisites of a good table, type of tabulation.

(9 Hrs)

UNIT 3:

Diagrammatic and graphic representation : Introduction, difference between diagrams and graphs, diagrammatic representation, general rules for construction for diagrams, types of diagrams, one dimensional diagrams, two dimensional diagrams, three dimensional diagrams, pictograms, cartograms, choice of diagrams, graphical representational data, technique of construction of graphs, general for graphing, graphs of frequency distributions, graphs of time series or histograms, semilogarthamic line graphs or ration charts, limitations of diagrams and graphs.

(9 Hrs)

UNIT 4:

Averages: Introduction , requisites of good average or measure of central tendency ,various measure of central tendencies, arithmetic mean, step deviation method for computing arithmetic mean, mathematical properties of arithmetic mean, weighted arithmetic mean, median, partition values, graphic methods of locating partition values, mode, computations of mode, merits and demerits of modes, graphic location of mode, empirical relation between mean(M),median(Md),mode(Mo),Geometric mean, merits and demerits of Geometric mean, compound interest formula, average rate of a variable which increases by different rates at different periods, weighted geometric mean and harmonic mean, merits and demerits of harmonic mean, weighted harmonic mean ,relation between arithmetic mean, geometric mean and harmonic mean and harmonic mean, selection of an average, limitations of averages.

(7 Hrs)

UNIT 5:

Dispertion: Introduction and meaning range, Quartile deviation, Mean deviation and average deviation, standard deviation, Coefficient of variation.

Skweness and Kurtosis: Introduction, Skweness, Moments, Charlier checks. Kurtosis.

(10 Hrs)

Text Books:

1. Fundamentals of Statistics by S C Gupta, Himalaya publishing house.

Reference Books:

1. Statistical Methods by S P Gupta, Sultan Chand & Sons, 2011
2. Statistical Concept and Application by Nabendu Pal and Sahadeb Sarkar, PHI.

B.Sc.(CS) 2.5-DSC-2B: OOP with C++

Total 48 Hrs

UNIT 1:

Introduction: Procedural languages, definition of OOP, Basic concept of OOP, Object, Class, Data Abstraction, Encapsulation, Data Hiding, member functions, Reusability, Inheritance, Creating new data Type, Polymorphism, Overloading, Dynamic binding, Message Passing**.**

C++ Features: The iostream class, C++ comments, C++ keywords, variable declaration, the const qualifier, the endl, setw, set Precision, Manipulators, The scope resolution operator, the new and delete operators**.**

Functions: Simple functions: function declaration, calling the function, function definition, passing argument to, returning value from function, passing constants, variables, pass by value, passing structure variables, pass by reference, default arguments, return statements, return by reference, overloaded functions, different number of arguments, different kinds of arguments, inline functions. **(10 Hrs)**

UNIT 2:

Objects & Classes: classes & objects, class declaration, class members, data constructors, destructors, member functions, class member visibility: private, public, protected. The scope of the class object constructors, default constructor, constructor with argument, constructor with default arguments, dynamic constructors, copy constructor, overloaded constructor, object as function arguments, member functions defined outside the class, objects as arguments, returning objects from functions, class conversion, manipulating private data members, destructors, classes, objects &memory, array as class member data, Array of objects, string as class member.

(10 Hrs)

UNIT 3:

Operator Overloading: Overloading unary operator, operator keyword, operator arguments, operator return value, nameless temporary objects, limitations of increment operator, overloading binary operator, arithmetic operator, comparison operators, arithmetic assignment operator, Data conversion: conversion between basic to class types, conversion between objects and basic types, conversion between objects of different classes**.**

(8 Hrs)

UNIT 4:

Inheritance: Derived class & Base class: Specifying the derived class accessing the base class members, the protected access specifier, derived class constructor, overriding member functions, public & private inheritance, access combinations, classes & structures, access specifies, level of inheritance: Multilevel inheritance, hybrid inheritance, multiple inheritance, member functions in multiple inheritance, constructors in multiple inheritance, Containership: classes within classes, Inheritance & program development**.**

(10 Hrs)

UNIT 5:

Virtual Functions: Normal member function accessed with pointers, virtual member function accessed with pointers, dynamic binding, pure virtual functions, Friend function: friends for functional notation, friend classes, this pointer, accessing member data with this, using this for returning values**.**

Templates & Exception Handling: Introduction, templates, class templates, function templates, member function templates, template arguments, Exception handling.

(10 Hrs)

Text Book:

1. E.Balaguruswamy: Object oriented Programming with C++ Tata McGraw Hill publications.
2. Lafore Robert: Object oriented Programming in Turbo C++ Galgotia Publications.

Reference Books:

1. Stanley B. Lippman, Josee Lajoie, Barbara E. Moo : C++ primer, 5th Edition, Addison-Wesley.
2. Prata : C++ primer Plus, 4th Edition, Person Education.
3. Strousstrup: The C++ programming Language Pearson Education .

B.Sc.(CS) 2.6-DSC-3B: DISCRETE MATHEMATICAL STUCTURE

Total: 48 Hrs

UNIT 1:

Fundamental principles of counting: The rules of sum and product, Permutations, combinations, the binomial theorem, combinations with repetitions.

(9 Hrs)

UNIT 2:

Fundamental of Logic: Basic connectives and truth tables, Logical equivalence, the laws of logic, logical implication, rules f inference, use of quantifiers, quantifiers, definitions and proofs of theorems.

(12 Hrs)

UNIT 3:

Set theory: sets and subsets, set operations and laws of set theory, counting and venn diagram, Probability.

(8 Hrs)

UNIT 4:

Properties of integers and Mathematical induction: the well-ordering principle, Mathematical induction, recursive definitions, the division algorithm, prime numbers, the GCD, Euclid's algorithm, the fundamental theorem of arithmetic.

(12 Hrs)

UNIT 5:

Relations and functions: Cartesian Products and relations, Functions, plain & one-one function, Onto functions.

(7 Hrs)

Text Books :

1. Ralph. P. Grimaldi, Discrete and Combinational Mathematics, An applied introduction, Pearson Education(LPE) Fourth edition, 4th Indian Reprint.
2. Kolman, Busby & ross, Discrete Mathematical 5/e, Pearson Education .

Reference Books:

1. C. L. Liu, Elements of Discrete Mathematics, McGraw Hill, 1985.
2. Richard Johnsonbaugh, Discrete Mathematics, 5th Edition, Pearson Education, 2003.
3. Rajendra Akerkar and Rupali Akerkar, Discrete Mathematics, Pearson Education, 2004

B.Sc.(CS) 2.7-DSC-1B(Pr): PROBABILITY & STATISTICS LAB

Programs:

1. Program to construct a discrete frequency distribution table and find mean and standard deviation.
2. Program to construct a continuous frequency distribution table for given data and find mean and standard deviation.
3. Program to find the mean, mode and median of continuous frequency distribution.
4. Program to find Karl Pearson correlation coefficient between two variables.
5. Program to find the rank correlation, coefficient between two variables.
6. Program to fit the regression equation X on Y and Y on X.
7. Program to fit Binomial distribution.
8. Program to fit straight line equation and obtain trend value.
9. Program to fit Poisson distribution.
10. Program to find AM, GM, HM for given set of observation.
11. Program to calculate GM for tabulated data.
12. Program to calculate combined AM and find HM for continuous set of data
13. Program to calculate combined SD.
14. Program to calculate median for raw set of data.
15. Program to find median for tabulated data.

Note: All programs should be carried out on UNIX/LINUX platform

B.Sc.(CS)-2.8-DSC-2B(Pr): OOP LAB

Programs:

1. Demonstrate digital clock
2. Calculate area and circumference of a circle using inline function
3. Demonstrate default arguments function.
4. Demonstrate object as function arguments and returning objects from function.
5. Input roll number, name, marks of three subjects and display total and average demonstrating array as object.
6. Swap two numbers using friend function.
7. Demonstrate single inheritance.
8. Demonstrate multiple inheritances.
9. Perform addition of 2 matrices using operator overloading.
10. Demonstrate multiplication of two matrices using operator overloading.
11. Demonstrate to overload Arithmetic Assignment "+=" and "-=" operators
12. Implement operations on stack.
13. Demonstrate derived class constructor and overriding member functions in base and derived class.
14. Sort elements using function template.
15. Demonstrate class template.
16. Demonstrate default constructor and parameterized constructor.
17. Demonstrate copy constructor.
18. Find area and circumference of rectangle and triangle using function overloading.
19. Compare two strings using equal operator.
20. Demonstrate virtual function.

Note: All programs should be carried out on UNIX/LINUX platform

SEMESTER - III

B.Sc.(CS)-3.1-AECC-7: ENGLISH-3

(English – Syllabus is decided by respective BoS)

B.Sc.(CS) 3.2-AECC-8: MIL-3

(MIL – Syllabus is decided by respective BoS)

B.Sc.(CS) 3.3-DSC-1C: DATA STRUCTURES USING 'C'

Total: 48 Hrs

UNIT 1:

Introduction to Data structures: Review of Structures and Pointers, Definition, Classification of Data structures: Primitive and Non-Primitive, Operations on Data structures. **Recursion:** Definition, Recursion in C, writing Recursive programs-Fibonacci, GCD, Factorial. **(8 Hrs)**

UNIT 2:

Stack: Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from infix to postfix, Applications of stacks.

Queue: Definition, Array representation of queue, Types of Queue: Simple Queue, Circular Queue, Double Ended Queue (dequeue), Priority Queue, Operations on all types of Queues **(10 Hrs)**

UNIT 3:

Linked list-Definition: Components of linked list, representation of linked list, Advantages and disadvantages linked list. Types of linked list: singly and doubly, circular and circular doubly linked list. Operations on singly linked list: creation, insertion, deletion, search and display. **(9 Hrs)**

UNIT 4:

Tree-Definition: Tree, Binary tree, Complete Binary tree, Binary search tree, Heap. Tree terminology: Root, Node, Degree of a node of a tree, Terminal nodes, on-terminal nodes, siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Travel of Binary tree: Pre order, In order and Post order.

(9 Hrs)

UNIT 5:

Searching and Sorting: Searching algorithm techniques: Sequential search, Binary search-Iterative and Recursive methods, Comparison between Sequential and binary Search**.** **Sorting:** General Background**:** Definition, different types: Bubble sort, Merge sort, Quick sort.

(12 Hrs)

Text Books:

1. Kamthane: Introduction to Data Structure in C. Pearson Education 2005.
2. Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron, Data Structure using C and C++ Pearson Education.

References Books:

1. Weiss, Data Structure and Algorithm Analysis in C, 2nd Edition, Pearson Education.
2. Lipschutz: Schaum's outline series Data Structures, Tata McGraw Hill.

B.Sc.(CS) 3.4-DSC-2C: MICROPROCESSOR 8085

Total 48 Hrs

UNIT 1:

Introduction of Microprocessor & Interfacing Devices: Introduction to Microprocessor, Evolutions of Microprocessor, Microprocessor based Systems, Microprocessor Instruction Sets & Various Computer Languages.

Microprocessor Architecture: Features of 8085 Microprocessor, PIN Diagram of 8085 Microprocessor, Address Bus & Multiplexed Address / Data Bus Control and status signals, Power-supply and clock frequency, Externally initiated signals including Interrupts Serial I/O Ports, Block Diagram of 8085 Microprocessor, 8085 Programming Model, 8085 BUS organization and 8085 registers, Microprocessor Operations: Microprocessor initiated Operations, Internal data operations, Externally Initiated operations, Microprocessor Communication & Bus Timings, De-multiplexing the Bus AD7 to AD0, Generating Control Signals, 8085 Machine Cycles & Bus Timings, Opcode Fetch Machine Cycle, Memory Read Machine Cycle Example of an 8085 – based microcomputer.

(12 Hrs)

UNIT 2:

Memory & I/O Interfacing: Memory Classifications, Flip-Flop or Latch as a storage Element, Memory Map and Addresses Memory Instruction, Fetch Memory Interfacing: Memory Structure & it's Requirements Basic Concepts in Memory Interfacing, Interfacing

Circuits, Address Decoding & Memory Addresses, Input & Output Devices: I/Os With 8-Bit Addresses. I/Os With 16-Bit Addresses, Logic Devices for Interfacing, Tri-State Devices, Buffer Encoders & Decoders, Interfacing of I/O Devices: Basic Interfacing Concepts, Interfacing Output Displays, Interfacing Input Devices, Memory Mapped I/O Comparison of Memory Mapped I/O & Peripheral I/O.

(10 Hrs)

UNIT 3:

Instruction Set & Programming Techniques Instruction Formats: Single Byte, Two Bytes & Three Bytes Instructions, Opcode Format Instruction, Timings & Operation Status, DATA Transfer Operations, Arithmetic Operations, Logic Operations, Branch Operations, Stack, I/O& Machine Control Instructions, Looping, Counting and Indexing Counter and Timing delays, Stack and Subroutines Code conversion, BCD Arithmetic operations and 16 Bit data operations, How to write an assemble language program & Execute a simple program.

(10 Hrs)

UNIT 4:

Programmable Interface Devices: 8155 I/O & Timer, IC & Programming of 8155, 8255 Programmable Peripheral Interface & Programming of 8255, 8259 Programmable Interrupt Controller, 8279 Display and keyboard controller.

(8 Hrs)

UNIT 5:

Advance Microprocessor: 8086 General Idea of Architectural Advancements of Microprocessors: Pipelining, Cache memory, Memory Management, Virtual Memory System, Features of 8086 Microprocessor, Register Organization of 8086: General Data Registers Segment, Registers Pointer and Index Registers, Flag Register, Internal Organization of 8086, Bus Interface Unit (BUI), Execution Unit (EU), Memory Segmentation, Flag register and description of all flag bits, Interrupts.

(8 Hrs)

Text Books:

1. Ramesh Gaonkar, Microprocessor Architecture, Programming, and application with 8085,Penram International Publication, 2011.
2. K. R. Venugopal & Rajkumar, Microprocessor x86 programming, BPB Publication, 2007.

Reference Books:

1. John Ufferbeck, The 8080/85 Family: Design, Programming & Interfacing, PHI India.
2. A. K. Ray & K. M. Bhurchandani, Advance Microprocessor and Peripherals, 2nd Edition, Tata McGraw Hill, 2006.

B.Sc.(CS) 3.5-DSC-3C: FUNDAMENTALS OF DIGITAL ELECTRONICS

Total: 48 Hrs

UNIT 1:

Number system and codes: Binary number system, decimal number system, octal number system, hexadecimal number system. Bases inter conversions. Representation of negative numbers 1's and 2's complements. Codes: BCD, GRAY, EXCESS-3.

(4 Hrs)

UNIT 2:

Boolean algebra and logic systems: Laws of Boolean algebra, Boolean laws. Evaluation of Boolean expression, De Morgan's theorems and proof, simplification on Boolean expressions using Boolean laws Basic gates (AND, OR, NOT): truth table, Definition, Boolean expression and symbols, universal gates (NAND, NOR): truth table, definition, Boolean expression and symbols, design of basic gates using NAND and NOR gates. Logical gates using NAND and NOR, Design of given Boolean expression using basic gates or NAND gate or NOR gate. XOR and XNOR gate (Definition, Boolean expression and symbols, truth table).

(10 Hrs)

UNIT 3:

Simplification of Boolean functions: SOP and POS form, min term and max term, expression of Boolean equation in Min and Max term (conversion of SOP and POS forms to standard form) K-map method: Rules, simplification of Boolean equation using K-map (up to 4 variables), without and with don't-care condition, Implementation using basic gates or NAND gate or NOR gate, Quine - Mc Cluskey Tabulation method, determination and selection of prime implicates.

(12 Hrs)

UNIT 4:

Combination logic: Design procedure, design of half adder and full adder, half subtract or and full sub tractor. Code converters:- BCD to Excess 3 code, gray code, magnitude comparator, encoders (BCD to decimal), decoder (decimal to BCD), multiplexer(4:1 and 8:1), de-multiplexer(1:4 and 1:8).

(8 Hrs)

UNIT 5:

Sequential logic: Introduction, Flip-flops – SR,JK, D, T, JK-MS (Detailed Study) Registers – Introduction, shift register- types and applications. Counters – synchronous and asynchronous counters (Up, down, up down).

(14 Hrs)

Text Books:

1. M. Moris Mano, Computer System Architecture, 2nd Edition, Prentice Hall of India.

Reference Books:

1. Heuring and Jordan, Computer systems design and architecture, Pearson Education
2. William Stallings, Computer Organization and Architecture, Pearson Education 2003.
3. Andrew S Tenenbaum, Structured Computer Organization, 3rd Edition, Prentice Hall of India(1990).

B.Sc.(CS) 3.6-DSC-4C: DATA COMMUNICATIONS

Total: 48 Hrs

UNIT 1:

Introduction: Data Communication: Components, Representation, Data flow. Networks: Network Criteria, Network Topology, Physical structure, Network Classification, The Internet, Protocols and Standards, Switching: Message, Packet and Circuit switching.

Network Models: Layered architecture, The OSI model, TCP/IP Protocol suite, ARPANET.

(8 Hrs)

UNIT 2:

Digital transmission and physical layer: Digital Representation of Information, Analog and Digital signals, Data rate limits, Digital to Analog conversion, Analog to digital conversion, **Digital transmission:** Line coding, Modulation, Transmission modes, **Multiplexing:** Frequency Division Multiplexing (FDM), Time Division Multiplexing(TDM), Wavelength Division Multiplexing(WDM). SONET**,** ISDN

Transmission Media: Guided media: Twisted Pair, Co-axial Cable, Optical fiber, Un-guided media. Cellular Telephones Generation of networks: 1G,2G,3G,4G.

(12 Hrs)

UNIT 3:

Datalink Layer: Datalink Layer Design Issues**, ARQ Protocols**: Stop and Wait, GO – Back - N, Selective Repeat Protocols. Efficiency of ARQ Protocols, Flow control, Sliding window flow control. Data link control: HDLC, PPP. Statistical Multiplexing, Error detection, Parity bit, Two-dimensional parity checks, Internal checksum, Polynomial codes.

(10 Hrs)

UNIT 4:

Medium access Control Protocols: Multiple access communication, Local Area Network-LAN Structure, MAC Sublayer, Logical link control layer, Random Access Protocol-ALOHA, Slotted ALOHA, CSMA, CSMA/CD. Scheduling Approaches to medium access control- Reservation Systems, Polling, Token Passing ring, Channelization-FDMA, TDMA, CDMA.

(10 Hrs)

UNIT 5:

LAN Standards- Ethernet and IEEE 802.3 LAN Standard, Token Ring and IEEE 802.5 LAN Standard, FDDI, Wireless LAN's and IEEE 802.11 LAN Standard. **Connecting LAN's:** Connecting Devices- Hubs, Repeaters, **Bridges:** Transparent Bridges, Source Routing Bridge, Mixed-media Bridge, Routers, Gateways, Backbone Networks, Virtual LAN's**.** **(8 Hrs)**

Text Books:

1. Alberto Leon-Garcia & Indra Widjaja, Communication Networks- Fundamental Concepts & Key Architecture, Mc.Graw Hill.
2. Behrouz Ferouzan, introduction to Data Communications & Networking TMH.
3. Stalling, Data and Computer Communications, 7/e, Pearson Education.

References Books:

1. Andrew S Tanenbaum Computer Networks, 4/e, Pearson Education.
2. S. Keshav, An Engineering Approach to Computer Networks. Pearson Education.

B.Sc.(CS) 3.7-DSC-1C(Pr): DATA STRUCTURES USING 'C' LAB

Programs:

1. Write a C program to read and Calculate item prices used in party and divide the expenses amount in friends equally in C using Structures.
2. Write a C program to calculate the length of the string using pointer.
3. Write a C program to simulate the working of Tower of Hanoi problem for N disks, print the total number of moves taken by the program.
4. Write a C program to create a file for N number of Employees; it should contain Emp. No., Name of the Employee, Basic Salary, DA, Total Salary.
5. Write a C program to demonstrate the working of stack of size N using an array. The operations to be supported are 1. PUSH 2. POP 3. DISPLAY.
6. Write a C program to convert an Infix Notation to Postfix Notation.
7. Write a C program to convert and Infix Notation to Prefix Notation.
8. Write a C program to simulate the working of an ordinary Queue using an array. Provide operations QINSERT, QDELETE and QDISPLAY.
9. Write a C program to implement Double Ended Queue using Array data structure.
10. Write a C program to implement Circular Queue
11. Write a C program to implement Priority Queue
12. Write a C Program to Create and display Singly Linked List.
13. Write a C program to sort a given linked list by bubble sort.
14. Write a C program to implement Dubbly Linked List.
15. Write a C program to implement Sequential Search Technique using static array & pointers.
16. Write a C program to implement Binary Search Technique using dynamic array.
17. Write a C Program to sort a list of N elements using Merge sort technique.
18. Write a C Program to sort a list of N elements using Quick sort technique.
19. Write a C Program to Tree Traversal: In-order, Pre-order, Post-order.
20. Write a C Program to Create Binary Tree.

Note: All programs should be carried out on UNIX/LINUX platform

B.Sc.(CS)-3.8-DSC-2C(Pr): MICROPROCESSOR LAB

Programs:

1. Program 1: 8- bit Subtraction
2. Program 2: 8- bit Division
3. Program 3: Palindrome
4. Program 4: Ascending order
5. Program 5: Descending order
6. Program 6: 16- bit Addition
7. Program 7: BCD to binary conversion
8. Program 8: Binary to BCD conversion
9. Program 9: Addition of a series of numbers
10. Program 10: 8- bit Multiplication
11. Program 11: Largest number in a list
12. Program 12: Stepper Motor
13. Program 13: Traffic Light
14. Program 14: LCD
15. Program 15: 7 Segment display
16. Program 16: Generation of Waveforms

Note: All the programs should execute on Simulators

SEMESTER - IV

B.Sc.(CS) 4.1-AECC-9: English-4

(English – Syllabus is decided by respective BoS)

B.Sc.(CS) 4.2-AECC-10: MIL-4

(MIL – Syllabus is decided by respective BoS)

B.Sc.(CS) 4.3-DSC-1D: DATA BASE MANAGEMENT SYSTEM

Total: 48 Hrs

UNIT 1:

Introduction: Database and Database Users, Characteristics of the Database Approach, Different People behind DBMS, Implication of Database Approach, Advantages of Using DBMS, When not to use a DBMS.

Database System concepts and Architecture: Data Models, Schemas and Instances, DBMS Architecture and Data Independence, Data Base Languages and interfaces, The Database System environment, Classifications of Database Management Systems.

(10 Hrs)

UNIT 2:

Data Modeling Using The Entity Relation Model: High Level Conceptual Data Models for Database Design With an Example, Entity Types Entity sets, Attributes, and Keys, ER-Model Concepts, Notations fro ER Diagrams, Proper Naming of Constructs, Relationships Types of Degree than two. Designing example ER diagrams for requirements

(8 Hrs)

UNIT 3:

Relational Data Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schema, Defining Relations, Update Operations on Relations and constraint violations, Basic Relational Algebra Operations, Additional Relational Operations. Queries in relational algebra using all the operations

(12 Hrs)

UNIT 4:

Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relational Schemas, Functional Dependencies, Normal Forms Based on primary Keys, General Definitions of Second And Third Normal Forms, Boyce-Codd Normal Form.

(6 Hrs)

UNIT 5:

Relational Database Language: Data definition in SQL-Queries in SQL, INSERT, DELETE, UPDATE Statements SQL, **Data Types in SQL:** Number Types, Character Type, NSL Character Types. **Components of SQL:** Data Definition Language (DDL), Data Manipulation Language (DML), Query Language (QL), Data Control Language (DCL), **Set**

Operations: Union, Intersection, Minus, Renaming of Tables. **SQL Operations:** Logical Operators (NOT IN, ALL, ANY, EXIST, NOT EXIST, LIKE, NOT LIKE, IS NULL, IS NOT NULL, AND, OR, NOT) **SQL Functions:** Number Functions, Character Functions, Date Functions, Aggregate Functions, **Integrity Constraints:** Advantages of Integrity Constraints, Primary Key, Unique Key, Super Key, Candidate Key, Composite Key, Foreign Key, Domain Constraint, Key Constraints VIEWS in SQL, Specifying general Constraints and assertions.

(12Hrs)

Text Books:

1. Elmasri & Navathe, Fundamentals of Database System (4ed), Pearson Education, 2003.
2. Sundarraman, Oracle 9i Programming a Primer,(1ed), Pearson Education.

Reference Books:

1. Kahate, Introductions to Database Management Systems, Pearson Education, 2004.
2. Abrahamsi silberschatag, Henry. F.Korth, S. Sudarshan, Database Systems Concepts, McGraw Hill.
3. Jefry. D. Ullaman, Principles of Database System. Oracle Press: ORACLE-Complete Reference.
4. C.J.Date, Introductins to Database Systems, (6ed) Addison Wesley, 1995.
5. Raghu Ram Krishnan, Database Management Systems, Second Edition, Mc.Graw Hill.2000.

B.Sc.(CS) 4.4-DSC-2D: JAVA PROGRAMMING

Total: 48 Hrs

UNIT 1:

Introduction to JAVA: JAVA Evolution: Java History, Java Features, How Java differs from C and C++, Java and Internet, Java and World Wide Web, Web browsers, Hardware and software requirements, Java Support Systems, Java Environment. **Overview of JAVA Language:** Introduction, Simple Java Program, More of Java, An Application with Two Classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. **Constants, Variables, and Data Types:** Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values. **Operators and Expressions:** Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Procedure of Arithmetic Operators, Type Conversion and Associativity, Mathematical functions. **Decision Making and Branching:** Introduction, Decision Making with if statement, simple if

statement, if...else statement, Nesting of if....else statements, the else if Ladder, the switch statement, the **?:** Operator. **Decision Making and Looping:** The while statement, The do statement, The for statement, Jumps in Loops, Labelled Loops.

(10 Hrs)

UNIT 2:

Classes, Arrays, Strings and Vectors: Classes, Objects and Methods: Introduction, Defining a class, Adding Variables, Adding Methods, Creating Objects, Accessing class members, Constructors, Methods Overloading, Static Members, Nesting of Methods. **Inheritance:** Extending a class, Overriding Methods, Final Variables and Methods, Finalizer Methods, Abstract Methods and Classes, Visibility Control. **Arrays, Strings and Vectors:** Arrays, One-dimensional Arrays, Creating an array, Two-dimensional Arrays, Strings, Vectors and Wrapper Classes. **(8 Hrs)**

UNIT 3:

Interfaces, Packages, and Multithreaded Programming: Interfaces: Multiple Inheritances: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. **Packages:** Putting Classes together: Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes. **Multithreaded Programming:** Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a thread, Life Cycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the Runnable Interface.

(10 Hrs)

UNIT 4:

Managing Exceptions, Applet Programming: Managing Errors and Exception: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging. **Applet Programming:** Introduction, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, More about Applet Tag, Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numerical Values, Getting Input from the user. **(12 Hrs)**

UNIT 5:

Graphics Programming, Input/Output: Graphics Programming: Introduction, The Graphics class, Lines and rectangles, circles and ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts.

(8 Hrs)

Text Books:

1. Shishir Gundavaram, CGI Programming on the World Wide Web, O'Reilly and Associates, (1996). (Chapter 1-7)
2. E. Balaguruswamy, Programming with JAVA, A Primer, 2nd Edition. TMH (1999), (Chapter 2-16)

Reference Books:

1. Thomas Boutel, CGI Programming in C and Perl, Addison—Wesley, (1996).
2. Jefry Dwight et al, Using CGI, (Second Edition), Prentice Hall, India, (1997).
3. Darrel Ince & Adam Freeman, Programming the Internet with Java, Addison—Wesley,(1997).
4. Ken Arnold & James Gosling, The Java Programming Language, Addison—Wesley,(1998).
5. Patrick Naughton & Herbert Schildt, JAVA 2: The Complete Reference, 3rd Edition, TMH, (1999).

B.Sc.(CS) 4.5-DSC-3D: OPERATION REASERCH

Total: 48 Hours

UNIT 1:

Linear Programming Problems: Origin and development of operations Research, Liner programming Problem-formulation of Linear Programming problem, Graphical solution, Theory of simplex method, Use of artificial variables and their solution, Duality theory and Sensitivity Analysis.

(12 Hrs)

UNIT 2:

Transportation Problem: Mathematical formulation of transportation problem, Initial Basic Feasible solution, North West corner rule, Matrix minima method, Vogal approximation method, for balanced Transportation Problem only.

(10 Hrs)

UNIT 3:

Assignment Problem: Mathematical formulation of on Assignment Problem, Assignment algorithm and simple illustrations.

(8 Hrs)

UNIT 4:

Network Analysis: Basic components of Network, Rules of drawing Network diagram, Time calculation in Networks, Critical Path Method and Project Evaluation and Review Techniques, Algorithm and flow chart for CPM & PERT.

(10 Hrs)

UNIT 5:

Theory of Games: Two-Person Zero – sum Games, The Maximin and Minmax principle, Saddle point and values of the Game, Game without Saddle points, Mixed stratergies, Solution for 2x2games,Graphical method Dominance property, Linear programming method and their solutions.

(8 Hrs)

Text Books:

1. Taha : Operaations Reserch,7/e.Pearson Education
2. Hamady A. Taha Operations Research,Collin Mac Millan 1982.
3. Kani Swarup, P.K. Gupta and Man Mohan Operation Researcch,Sultan Chand and Sons,4793/23,Darya Ganj,New Delhi-110 002

Reference Books :

1. Billey E.Gillett, Introduction to Operations Research, Himalyal Publishing House, Delhi 1979
2. Frederick S. Hiller, Gaxald J. Deibermann, OperationResearcch, Holden Day Inc. 1974
3. Narag. A.S., Linear Programming and Decision Making, Sultan Chand and Sons.

B.Sc.(CS) 4.6-DSC-4D: SOFTWARE ENGINEERING

Total: 48 Hrs

UNIT 1:

Introduction: The Evolving role of Software, Software: Software Characteristics, Software Components, Software Applications. **The Process**: Layered Technology. Process, Methods, Tools. The Software Process, Software Process Model: Linear Sequential Model, Prototyping Model, RAD Model, Incremental Model, Spiral Model.

(8 Hrs)

UNIT 2:

Analysis Concepts and Principles: Requirements Analysis, Communication Techniques, Analysis Principles, Software Prototyping, Specification principles, Software requirements Specification. Analysis Modeling: Brief History, Elements of the Analysis Model, Data Modeling, Function Modeling and Information Flow, Behavioral Modeling, Data Dictionary.

(11 Hrs)

UNIT 3:

Design Concepts and Principles: Software Design and Software Engineering, Design Process, Design Principles, Design Concepts, Effective Modular Design: Cohesion, Coupling. Design Documentation. Software Quality Assurance: Quality Concepts, Software Quality Assurance, Software Reviews, Software Reliability.

(11 Hrs)

UNIT 4:

Software Testing Techniques and Strategies: Software Testing Fundamentals: Testing Objectives, Testing Principles, Testability, Test Case Design, white Box Testing, Basis Path Testing, Control Structure Testing, Black Box Testing, Strategic Approach to Software Testing, unit Testing, Integration Testing, Validation Testing, System Testing.

(10 Hrs)

UNIT 5:

Object Oriented Concepts and Principles: The Object Oriented Paradigm, Object Oriented Concepts, Object Oriented Analysis Introduction, Object Oriented Design: Design for Object-Oriented System, The OOD Landscape, Generic Components, The Object Oriented Process.

(8 Hrs)

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Text Books:

1. Roger Pressman, Software Engineering- a Practitioner's Approach.

Reference Books:

1. Ian Sommerville, Software Engineering, 6th Edition, Pearson, Publication Ltd.
2. Carlo Ghejgietal, Fundamentals of Software Engineering Pearson Education.

B.Sc.(CS) 4.7-DSC-1D(Pr): DATA BASE MANAGEMENT SYSTEM LAB

Programs:

1. A) Create the following relation for the student :

   Student (regno : string , name : string, class :string, bdate: date, marks1:int, marks1:int, marks2:int, marks3:int)

   i. Enter atleast five tuples of the above relation
   ii. Demonstrate the usage of following clauses for the above relation
      a. Where c. Having
      b. Order By d. Group By
   iii. Demonstrate the usage of following clauses for the above relation
      a. Sum c. Count e. Between
      b. Avg d. Like f. Max & Min
   iv. Demonstrate the rollback and commit command for the above relation

   B) Consider the following database that maintain information about employees & Departments.

   Employee(empid: int, ename:string, age:int, salary:int, #deptno:int)
   Department(deptno:int, dname: string, #manager-id: int)

   i. Create the above tables by properly specifying the primary keys & foreign keys.
   ii. Enter at least 5 tuples for each relation.
   iii. Display emp-id & emp name whose salary lies between 10,000 and 50,000.
   iv. List empname & salary for all the employee working for CS Dept.
   v. Display empname & deptname for all the managers.

2. Consider the following schema for OrderDatabase:
   SALESMAN (Salesman_id, Name, City, Commission)

   CUSTOMER (Customer_id, Cust_Name, City, Grade,Salesman_id)

   ORDERS (Ord_No, Purchase_Amt, Ord_Date, #Customer_id, Salesman_id)

   Write SQL queries to

   i. Count the customers with grades above Bangalore's average.
   ii. Find the name and numbers of all salesmen who had more than one customer.
   iii. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)
   iv. Create a view that finds the salesman who has the customer with the highest order of a day.
   v. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

3. Consider the Insurances database given below. The primary keys are underlined and the data types are specified.

PERSON (DRIVER-ID#: string, name: string, address: string)
CAR (Regno: string, model: string, year: int)
ACCIDENT (report-number: int, date: date, location: string)
OWNS (#driver-id: string, #Regno: string)
PARTICIPATED (#driver-id: string, #Regno: string, #report-number: int, Damage amount: int)

i. Create the above tables by property specifying the primary keys and the foreign keys.
ii. Enter atleast five tables for each relation.
iii. Demonstrate how you
a. Update the damage amount for the car with a specific Regno in the accident with report number 12 to 25000.
b. Add a new accident to the database.
iv. Find the total number of people who owned cars that were involved in accidents in 2002.
v. Find the total number of accidents in which cars belonging to a specific model were involved

4. The following tables are maintained by a book dealer.

AUTHOR (author-id: int, name: string, city: string, country: string)
PUBLISHER (publisher-id: int, name: string, city: string, country: string)
CATALOG (book-id: int, title: string, author-id#: int, publisher-id#: int, category-id#: int, year: int, price: int)
CATEGORY (category-id: int, description: string)
ORDER-DETAILS (order-no: int, #book-id: int, quantity: int)

i. Create the above tables by properly specifying the primary keys and the foreign keys.
ii. Enter at least five tuples for each relation.
iii. Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog.
iv. Find the author of the book, which has maximum sales.
v. Demonstrate how you increase the price of books published by a specific publisher by 10%.

5. Consider the following database of student enrolment in courses and books adopted each course.

STUDENT (regno: string, name: string, major: string, bdate: date)
COURSE (course: int, cname: string, dept: string)
ENROLL (#regno: string, course#: int, sem: int marks: int)
TEXT (book-ISBN: int, book-title: string, publisher: string, author: string)

BOOK_ADOPTION (course#: int, sem: int, book-ISBN#: int)

i. Create the above tables by properly specifying the primary keys and the foreign Keys.
ii. Enter at least five tuples for each relation.
iii. Demonstrate how you add a textbook to the database and make this book be adapted by some department.
iv. Produce list of textbooks (include Course#, Book-ISBN, Book-title) in the alphabetical order for courses offered by the CS department that use more than two books.
v. List any department that has its adopted books published by a specific publisher.

6. Consider the following database for library management system

BOOK (Book_id, Title, Publisher_Name, Pub_Year)

BOOK_AUTHORS (#Book_id, Author_Name)

PUBLISHER (Name, Address, Phone)

BOOK_COPIES (#Book_id, #Branch_id, No-of_Copies)

BOOK_LENDING (#Book_id, #Branch_id, Card_No, Date_Out, Due_Date)

LIBRARY_BRANCH (Branch_id, Branch_Name, Address)

Write SQL queries to

i. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.
ii. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun2017
iii. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
iv. Create a view of all books and its number of copies that are currently available in the Library.

7. Consider the schema for Company Database:

EMPLOYEE (SSN, Name, Address, Sex, Salary, #SuperSSN, DNo)
DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)
DLOCATION (#DNo,DLoc)
PROJECT (PNo, PName, PLocation, #DNo) WORKS_ON (#SSN,# PNo, Hours)
Write SQL queries to

i. Make a list of all project numbers for projects that involve an employee whose last name is ‘Scott’, either as a worker or as a manager of the department that controls the project.

ii. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percentraise.
iii. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

iv. Create a view with columns dept name and dept location. Display name of dept located in 'Dharwad' on this view.

Note: 1. All the experiments are to be carried out using MySql
2. Draw ER diagram and Schema diagram for each lab program.

B.Sc.(CS) 4.8-DSC-2D(Pr): JAVA LAB

Programs:

1. Display fibonacci series up to n terms using command line arguments.
2. Demonstrate single inheritance.
3. Sort n elements using an array.
4. Implement constructor overloading by passing different number of parameter of different types.
5. Demonstrate string methods.
6. Demonstrate vector methods.
7. Demonstrate concept of interface.
8. Demonstrate concept of creating, accessing and using a package.
9. Demonstrate multithreaded programming.
10. Demonstrate thread priority.
11. Create an applet to draw a human face.
12. Demonstrate simple banner applet.
13. Program to count number of strings, integers and float values through command line arguments.
14. Program to accept a message from the keyboard and display the no. of words and non alphabetical characters.
15. Demonstrate creation of list using an applet.
16. Demonstrate concept of event handling.
17. Program to demonstrate different types of fonts.
18. Create an applet to tokenize the string.
19. Design a simple calculator using java applets.
20. Implement static and dynamic stack using interface using abstract class.

SEMESTER - V

B.Sc.(CS) 5.1-DSC-1E: WEB TECHNOLOGIES

Total: 48 Hours

UNIT 1:

Introduction: Introduction to HTML, What is HTML and Where did it come from?, HTML Syntax, Semantic Markup, Structure of HTML Documents, Quick Tour of HTML Elements, HTML5 Semantic Structure Elements, **Introduction to CSS**: What is CSS, CSS Syntax, Location of Styles, Selectors, The Cascade: How Styles Interact, The Box Model, CSS Text Styling.

(8 Hrs)

UNIT 2:

HTML Tables and Forms: Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, Table and Form Accessibility, Microformats, **Advanced CSS:** Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks.

(10 Hrs)

UNIT 3:

JavaScript: Client-Side Scripting, What is JavaScript and What can it do?, JavaScript Design Principles, Where does JavaScript Go?, Syntax, JavaScript Objects, The Document Object Model (DOM), JavaScript Events, Forms, Introduction to Server-Side Development with PHP, What is Server-Side Development, A Web Server's Responsibilities, Quick Tour of PHP, Program Control, Functions

(10 Hrs)

UNIT 4:

PHP Arrays and Superglobals: Arrays, $_GET and $_POST Superglobal Arrays, $_SERVER Array, $_Files Array, Reading/Writing Files, PHP Classes and Objects, Object-Oriented Overview, Classes and Objects in PHP, Object Oriented Design, Error Handling and Validation, What are Errors and Exceptions?, PHP Error Reporting, PHP Error and Exception Handling.

(10 Hrs)

UNIT 5:

Managing State: The Problem of State in Web Applications, Passing Information via Query Strings, Passing Information via the URL Path, Cookies, Serialization, Session State, HTML5 Web Storage, Caching, Advanced JavaScript and jQuery, JavaScript Pseudo-Classes, jQuery Foundations, AJAX, Asynchronous File Transmission, Animation, Backbone MVC Frameworks, XML Processing and Web Services, XML Processing, JSON, Overview of Web Services.

(10 Hrs)

Text Books:

1. Randy Connolly, Ricardo Hoar, **"Fundamentals of Web Development",** 1stEdition, Pearson Education India.

Reference Books:

1. Robin Nixon, "Learning PHP, MySQL &JavaScript with jQuery, CSS and HTML5", 4thEdition, O'Reilly Publications, 2015. (ISBN:978-9352130153).
2. Luke Welling, Laura Thomson, "PHP and MySQL Web Development", 5th Edition.Pearson Education, 2016. (ISBN:978-9332582736).
3. Nicholas C Zakas, "Professional JavaScript for Web Developers", 3rd Edition, Wrox/Wiley India, 2012. (ISBN:978-8126535088).
4. David Sawyer Mcfarland, "JavaScript & jQuery: The Missing Manual", 1st
5. Edition, O'Reilly/Shroff Publishers & Distributors Pvt Ltd, 2014 (ISBN:978-9351108078)

B.Sc.(CS) 5.6-DSC-1E(Pr): WEB DESIGNING LAB

Programs:

1. A. Create a webpage that prints your name on the screen. (HTML)
   B. Create a webpage and set its title to "This is a webpage". (HTML)
2. Print the numbers 1 - 10, each number being a different color. (HTML)
3. Print a paragraph that is a description of a book, include the title of the book as well as its author. Names and titles should be underlined, adjectives should be italicized and bolded. (HTML)
4. Print the squares of the numbers 1 - 20. Each number should be on a separate line, next to it the number 2 superscripted, an equal sign and the result. (Example: 10^2= 100) (HTML)
5. Create links to five different pages on five different websites that should all open in a new window. (HTML)
6. A. Setting a background image for a page Using CSS
   B. Setting text color and background color Using CSS
7. Setting the font type of text Setting the font size of text Setting the font color of text Setting the font style of text Using CSS
8. Create a webpage with two images which alternately changes on mouse over using CSS.
9. Write a JavaScript program to display the current day and time in the following format. Go to the editor

Sample Output : Today is : Tuesday.
Current time is : 10 PM : 30 : 38

10. Write a JavaScript program to convert temperatures to and from Celsius, Fahrenheit.
11. Write a JavaScript program to find the largest of three given integers.
12. Create a webpage with two textboxes and command buttons to perform arithmetic operations and display the result in appropriate dialog boxes using JavaScript.
13. Write a Java Script program to read the details of a student and store the same on to the MS Access database.
14. A. Write a program to count 5 to 15 using PHP loop
    B. Write a factorial program using for loop in PHP
15. Write a program to create Chess board in PHP using for loop
16. Write a program to upload and display an image using PHP.
17. Conditions: You can use html table having width=”400px” and take “30px” as cell height and width for check boxes.
18. Write a simple calculator program in PHP using switch case
19. Write a program to calculate Electricity bill in PHP
20. Write a PHP program to find the length of the string and count the words in the string

B.Sc.(CS)E 5.2A-DSE-1E: Elective-1: MANAGEMENT INFORMATION SYSTEM

Total: 48 Hours

UNIT 1:

Management Information Systems: Management Information System: Concept, MIS: Definition, Role of the Management Information System, impact of the Management Information System, Management Information, System and computer, Management Information System and academics, MIS and the user**.**

Role and Importance of Management: Introduction to Management, Approaches to Management, Functions of the Manager, Managers and the Environment, Management as a Control System, Management by Exception, **MIS:** A support to the Management.

(10 Hrs)

UNIT 2:

Process Management: Management Effectiveness, planning, Organising, Staffing, Coordinating and directing, Controlling, **MIS:** A Tool for Management Process.

Organization Structure and Theory: Basic Model of Organization Structure, Modifications to the Basic Model of Organization Structure, Organization Behavior, Organization as a System, MIS: Organization.

(15 Hrs)

UNIT 3:

Strategic Management of Business: The Concept of Corporate Planning, Essentially of Strategic, Planning, Development of the Business Strategies, Types of Strategies, Short-range Planning, Tools of Planning, MIS: Business Planning.

Decision Making: Decision Making Concepts, Decision Methods, Tools and Procedures, Behavioral Concepts in Decision Making, Organizational Decision Making Concepts, MIS and Decision Making concepts.

(13 Hrs)

UNIT 4:

Development of MIS: Development of Long Range Plans of the MIS, Ascertaining. The Class of Information of the MIS, Management of Quality in the MIS, Organization for Development of the MIS, MIS: The Factors of Success and Failure.

(6 Hrs)

UNIT 5:

Decision Support System: Decision Support System (DSS): Concept and Philosophy, DSS: Deterministic Systems, Artificial Intelligence (AI) System, Knowledge Based Expert System (KBES), MIS and Role of DSS.

(4 Hrs)

Text Books:

1. W.S.Jawadekar, Management Information Systems, Tata McGraw-Hill.
2. Laudon and Laudon, Management Information Systems, Pearson Education, Asia.

Reference Books:

1. Devis and Olson, Management Information System, Tata McGraw-Hill.

B.Sc.(CS)E 5.2B-DSE-1E: Elective -1: MANAGERIAL ECONOMICS

Total: 48 Hours

UNIT 1:

Introduction: Meaning and definition- Managerial Economics, Salient features and significance, role of managerial economics, scope of managerial economics, uses/objectives of managerial economics, meaning of micro and macro economics, differences between micro and macro economics, importance and uses of micro economics, limitations of micro economics. **(8 Hrs)**

UNIT 2:

Demand Analysis: Meaning of demand, individual and market demand, determinants of demand, demand-function, schedule, curve, the law of demand, exceptions to the law of demand, change in quantity demand vs change in demand, reasons for change in demand, Elasticity of demand, factors influencing elasticity of demand, price elasticity of demand and types, income elasticity of demand and types, cross elasticity of demand. Demand forecasting-meaning, significance and methods. **(10 Hrs)**

UNIT 3:

Supply Analysis: Meaning of supply, determinants of supply, law of supply, extension and contraction in supply, increase and decrease in supply, causes of change in supply, elasticity of supply.

(4 Hrs)

UNIT 4:

Production Analysis and Cost Analysis: Production analysis: Concept of production function, factors of production, laws of production- the law of diminishing marginal returns, the law of variable proportions, the law of returns to scale, isoquants (only meaning), economies of scale and diseconomies of scale. Cost analysis: meaning of cost, types of cost, cost concepts-TFC, TVC, TC, AC, and MC their meaning and computation.

(14 Hrs)

UNIT 5:

Market Structures and Pricing Policies: Meaning of market, Pure and Perfect Competition & its features, Imperfect Competition & its features, Monopoly, Duopoly, Oligopoly, Monopolistic and Oligopolistic markets. Pricing policies – objective of pricing policy, factors involved in pricing policy, pricing methods- cost plus, going rate, pricing for rate of return, administered price.

(12 Hrs)

Text Books:

1. Managerial Economics, D.N. Dwivedi, Vikas publication
2. Managerial Economics - Theory and Application - D. M. Mithani

Reference Books:

1. Managerial Economics, Stephen Hill, Palgrave Macmillan
2. Managerial Economics – Analysis, Problems and Cases, P.L. Mehta, Sultan Chand Sons, New Delhi
3. Managerial Economics – Varshney and Maheshwari, Sultan Chand and Sons, New Delhi
4. Managerial Economics – D. Salvatore, McGraw Hill, New Delhi
5. Managerial Economics – Pearson and Lewis, Prentice Hall, New Delhi
6. Managerial Economics – G.S. Gupta, T M H, New Delhi

B.Sc.(CS)E 5.2C-DSE-1E: Elective-I: DECISION SUPPORT SYSTEMS

Total: 48 Hours

UNIT 1:

Decision Support Systems: An Overview: DSS Configuration, What is DSS? Characteristics and Capabilities of DSS, Components of DSS, The Data Management Subsystem, The Model Management Subsystem, User Interface Subsystem, The Knowledge-Based Management Subsystem, The User, DSS Hardware, DSS Classification.

(8 Hrs)

UNIT 2:

Decision Support Systems Development: Introduction to DSS development, The Traditional System Development Life cycle, Alternate Development Methodologies, Prototyping: The DSS Development Methodology, DSS Technology Levels and Tools, DSS Development Platforms, DSS Development Tool Selection, Team-Developed DSS, End User-Developed DSS, Putting the System Together.

(10 Hrs)

UNIT 3:

Group Support Systems: Group Decision Making, Communication and Collaboration, Communication Support, Collaboration Support: Computer Supported Cooperative work, Group Support Systems, Group Support Systems Technologies, Group Systems Meeting Room and Online, The GSS Meeting Process, Distance Learning, Creativity and Idea Generation.

(10 Hrs)

UNIT 4:

Decision Making and Computerized Support-1: Managers and Decision Making, Managerial-Decision Making and Information Systems, Managers and Computer Support, Computerized Decision Support and the Supporting technologies, A frame work for decision support, The concept of Decision Support systems, Group Decision Support Systems, Enterprise Information Systems, Knowledge Management systems, Expert Systems, Artificial Neural Networks, Hybrid Support Systems. Decision-Making Systems, Modelling and Support: Introduction and Definitions, Systems, Models.

(10 Hrs)

UNIT 5:

Decision Making and Computerized Support-2: Phases of Decision Making Process, Decision-Making: The Intelligence Phase, Decision Making: The Design Phase, Decision Making: The Choice Phase, Decision Making: Implementation Phase, How decisions are

supported, Personality types, gender, human cognition, and decision styles; The Decision-Makers.

(10 Hrs)

Text Books:

1. Efraim Turban. Jay E. Aronson, Ting-Peng Liang: Decision Support Systems and Intelligent Systems, 8th Edition, Pearson Education, 2008. (Chapters 1, 2, 3, 6, 7, 8 excluding 8.7 to 8.9, 9, 15)

Reference Books:

1. Sprague R.H. Jr and H.J. Watson: Decision Support Systems, 4th Edition, Prentice Hall, 1996.

B.Sc.(CS)E 5.3A-DSE-2E: Elective-II: COMPUTER GRAPHICS

Total: 48 Hours

UNIT 1:

Graphics system: Introduction of Computer Graphics, Applications of CG. Video Display Devices: Cathode-Ray Tube, Raster-Scan Displays, Random-Scan Displays, Color CRT monitors, Flat-Panel Displays, Three-Dimensional viewing Devices, Raster-Scan Systems and Random-Scan Systems, Hard copy devices, input devices, Graphic software.

(8 Hrs)

UNIT 2:

Output Primitives: Points and lines, Line drawing algorithm: Digital Differential Analyzer (DDA), Bresenham's line algorithms, Circle generating algorithms. Ellipses (Example Problems), Attributes of output primitives: Line type, Line Width, Line color, Area filling, scan line algorithm**.** **(10 Hrs)**

UNIT 3:

Two dimensional transformations: Basic transformation: translation, scaling and Rotation. Matrix representation and homogeneous co-ordinates, composite transformation: translation, scaling and rotations, Other Transformations. Transformations Between Coordinate Systems, Roster methods for transformation, **Two-Dimensional Viewing and clipping:** The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-To-Viewport Coordinate Transformation. Clipping algorithms: line clipping, area clipping, Polygon clipping.

(14 Hrs)

UNIT 4:

Interactive Input Methods: Physical input devices: Keyboard, touchpanels, lightpen, Graphics tablets, joysticks, mouse, trackball, interactive picture construction techniques.

Three Dimensional concepts: Three-dimensional co-ordinate systems, three-dimensional display techniques, perspective and parallel projections, polygon surfaces, curved surfaces, Quadric Surfaces, Bazier Curves and Surfaces octrees.

(10 Hrs)

UNIT 5:

Segments: Introduction, Segment Table, Function of Segmenting the Display File, More about segments, Image Transformation, Raster Techniques, Animation using Segments.

(6 Hrs)

Text books:

1. Donald Hearn & M. Pauline Baker, Computer Graphics C Version, Pearson education/PHI.
2. Computer Graphics-Steven Harrington, McGH

Reference books:

1. Principles of Interactive Computer Graphics-Newman and Sproull, McGraw Hill
2. Graphics Under C-Yeshwant Kanetkar, BPB publications.
3. James D foley, Adries Van Dam, Steven K Feiner, John F Hughes, Computer Graphics, Addison Wesley,1997.

B.Sc.(CS)E 5.3B-DSE-2E: Elective-II: COMPUTER NETWORKS

Total: 48 Hours

UNIT 1:

The Network Layer: Network Layer Design Issues, Routing Algorithms, The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Anycast Routing, Routing for Mobile Hosts, Routing in Ad Hoc Networks.

(10 Hrs)

UNIT 2:

Congestion Control Algorithms: Approaches to Congestion Control, Traffic-Aware Routing, Admission Control, Traffic Throttling, Load Shedding, Quality of Service, Application Requirements, Traffic Shaping, Packet Scheduling, Admission Control, Integrated Services, Differentiated Services, Internet working, How Networks Can Be Connected, Internetwork Routing, Packet Fragmentation.

(8 Hrs)

UNIT 3:

The Transport Layer: The Transport Service, Berkeley Sockets, Elements Of Transport Protocols, Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Multiplexing, Congestion Control

{10 Hrs)

UNIT 4:

The Internet Transport Protocols: UDP, Introduction to UDP, Remote Procedure Call, Real-Time Transport Protocols, The Internet Transport Protocols: TCP, Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, TCP Connection Management Modeling, TCP Sliding Window, TCP Timer Management, TCP Congestion Control, Performance Issues, Performance Problems in Computer Networks, Network Performance Measurement, Host Design for Fast Networks, Fast Segment Processing, Header Compression, Protocols for Long Fat Networks, Delay-Tolerant Networking, DTN Architecture.

(10 Hrs)

UNIT 5:

The Application Layer: DNS-The Domain Name System, Electronic Mail, Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery, The World Wide Web, Architectural Overview, Static Web Pages, Dynamic Web Pages and Web Applications, HTTP—The Hyper Text Transfer Protocol, The Mobile Web, Web Search, Streaming Audio And Video, Content Delivery.

(10 Hrs)

Text Books:

1. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson
2. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach,Sixth edition, Pearson,2017 .

Reference Books:

1. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition,McGraw Hill, Indian Edition
2. L Peterson and Brusce S Davie, Computer Networks, fifth edition, ELSEVIER
3. Mayank Dave, Computer Networks, Second edition, Cengage Learning

B.Sc.(CS)E 5.3C-DSE-2E: Elective-II: OBJECT ORIENTED ANALYSIS & DESIGN

Total: 48 Hours

UNIT 1:

Introduction: Overview of object oriented system development, Object basics, The Unified Process, Modelling concepts, Modelling as a design technique, Analysis and modelling, UML diagrams, Use case Modelling, Class Modelling, State Modelling, Interaction Modelling.

(10 Hrs)

UNIT 2:

Requirements & More Modelling: Object Constraint Language, Inception, Evolutionary Requirements, Domain Models, System Sequence Diagrams, Operation Contracts.

(8 Hrs)

UNIT 3:

Design and Principles Of Design: Requirements to Design, Design Patterns, Logical Architecture, Package diagram, Design patterns, Model, View, Control pattern, Detailed design – Object design with GRASP pattern, Detailed class diagram with Visibility.

(10 Hrs)

UNIT 4:

Mapping To Code: Mapping designs to code, Test Driven development and refactoring, UML Tools and UML as blueprint

(10 Hrs)

UNIT 5:

More Patterns: Analysis update, Objects with responsibilities, Applying design patterns, Architectural Analysis, Logical Architecture Refinement, Package Design, Persistence framework with patterns.

(10 Hrs)

Text Books:

1. Michael Blaha and James Rumbaugh, “Object-oriented modeling and design with UML”, Prentice-Hall of India, 2005.
2. Craig Larman. “Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development”, 3rd ed, Pearson Education, 2005.

Reference Books:

1. Ali Bahrami, “Object Oriented Systems Development”, McGraw-Hill, 1999.
2. Booch, Grady. Object Oriented Analysis and Design. 2nd ed. Pearson Education 2000.
3. Fowler, Martin. UML Distilled. 3rd ed. Pearson Education. 2004.
4. Lunn, Ken. Software development with UML. Palgrave Macmillan. 2003.
5. O’Docherty, Mike. Object-Oriented Analysis & Design. Wiley. 2005.

B.Sc.(CS)E 5.4A-DSE-3E: Elective-III: ARTIFICIAL INTELLIGENCE

Total: 48 Hours

UNIT 1:

Introduction: What is AI? Intelligent Agents: Agents and Environment; Rationality; the Nature of Environment; the Structure of Agents. Problem solving: Problem-Solving Agents; Example Problems; Searching for Solution; Uninformed Search Strategies.

(8 Hrs)

UNIT 2:

Informed Search, Exploration, Constraint Satisfaction, Adversial Search: Informed Search Strategies; Heuristic functions; On-line Search agents and Unknown environment. Constraint satisfaction problems; Backtracking search for CSPs, **Adversial search**: Games; Optimal decisions in games; Alpha-Beta pruning.

(10 Hrs)

UNIT 3:

Logical Agents: Knowledge-based agents; The wumpus world as an example world; Logic; propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic.

(10 Hrs)

UNIT 4:

First-Order Logic, Inference in First-Order Logic – 1: Representation revisited; Syntax and semantics of first-order logic; Using first-order logic; Knowledge engineering in first-order logic. Propositional versus first-order inference; Unification and lifting.

(10 Hrs)

UNIT 5:

Inference in First-Order Logic – 2: Forward chaining; Backward chaining; Resolution.

(10 Hrs)

Text Books:

1. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, 2nd Edition, Pearson Education, 2003.

Reference Books:

1. Elaine Rich, Kevin Knight: Artificial Intelligence, 3rd Edition, Tata McGraw Hill, 2009.
2. Nils J. Nilsson: Principles of Artificial Intelligence, Elsevier, 1980.

B.Sc.(CS)E 5.4B-DSE-3E: Elective- III: INTRODUCTION TO MACHINE LEARNING

Total: 48 Hours

UNIT 1:

Introduction: What Is Machine Learning? Examples of Machine Learning Applications, **Supervised Learning:** Learning a Class from Examples Vapnik-Chervonenkis (VC) Dimension, Probably Approximately Correct (PAC) Learning, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm.

(10 Hrs)

UNIT 2:

Bayesian Decision Theory: Introduction, Classification, Losses and Risks, Discriminant Functions, Utility Theory, Value of information, Bayesian Networks, Influence Diagrams, Association Rules.

(10 Hrs)

UNIT 3:

Parametric Methods: Introduction, Maximum Likelihood Estimation, Evaluating an Estimator: Bias and Variance, The Bayes' Estimator, Parametric Classification, Regression, Tuning Model Complexity: Biasj Variance Dilemma, Model Selection Procedures.

(10 Hrs)

UNIT 4:

Multivariate Methods: Multivariate Data, Parameter Estimation, Estimation of Missing Values, Multivariate Normal Distribution, Multivariate Classification, Tuning Complexity, Discrete Features, Multivariate Regression. Dimensionality Reduction: Introduction, Subset Selection, Principal Components Analysis, Factor Analysis, Multidimensional Scaling, Linear Discriminant Analysis.

(10 Hrs)

UNIT 5:

Clustering: Introduction, Mixture Densities, k-Means Clustering, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the Number of Clusters.

(8 Hrs)

Text Books:

1. Ethem Alpaydin, 2004, ‘Introduction to machine Learning’, PHI.

Reference Books:

1. Tom M Mitchell, 1996, Machine Learning McGraw Hill Publications.

B.Sc.(CS)E 5.3C-DSE-3E: Elective-III: INTERNET OF THINGS (IOT)

Total: 48 Hours

UNIT 1:

Introduction : What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

(8 Hrs)

UNIT 2:

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

(10 Hrs)

UNIT 3:

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

(10 Hrs)

UNIT 4:

Data and Analytics for IoT: An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.

(10 Hrs)

UNIT 5:

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

(10 Hrs)

Text Books:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978- 9386873743)
2. Srinivasa K G, "Internet of Things", CENGAGE Leaning India, 2017.

Reference Books:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. (ISBN: 978-8173719547)
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

B.Sc.(CS) 5.5-SEC-1E: MINI PROJECT-I

SEMESTER -VI

B.Sc.(CS) 6.1-DSC-1F: PYTHON PROGRAMMING

Total: 48 Hours

UNIT 1:

Introduction: Installing Python, Simple program using Python, Expressions and Values, Variables and Computer. Memory, error detection, multiple line statements, Designing and using functions, functions provided by Python, Tracing function calls in memory model, omitting return statement. **Working with Text:** Creating Strings of Characters, Using Special Characters in Strings, Creating a Multiline String, Printing Information, Getting Information from the Keyboard, A Boolean Type, Choosing Statements to Execute, Nested If Statements, remembering the Results of a Boolean Expression Evaluation.

(10 Hrs)

UNIT 2:

A Modular Approach to Program Organization: Importing Modules, Defining Your Own Modules, Testing Code Semi automatically Grouping Functions Using Methods: Modules, Classes, and Methods, Calling Methods the Object-Oriented Way, Exploring String Methods, Underscores, **Storing Collections of Data Using Lists:** Storing and Accessing Data in Lists, modifying Lists, Operations on Lists, Slicing Lists, Aliasing, List Methods, Working with a List of Lists.

(10 Hrs)

UNIT 3:

Repeating Code Using Loops: Processing Items in a List, Processing Characters in Strings, Looping, Over a Range of Numbers, Processing Lists Using Indices, Nesting Loops in Loops, Looping Until a Condition Is Reached, Repetition Based on User Input, Controlling Loops Using Break and Continue. **Reading and Writing Files:** Kinds of files, Opening a File, Techniques for Reading Files, Files over the Internet, Writing Files, and Writing Algorithms That Use the File-Reading Techniques, Multiline Records.

(10 Hrs)

UNIT 4:

Storing Data Using Other Collection Types: Storing Data Using Sets, Storing Data Using Tuples, Storing Data Using Dictionaries, Inverting a Dictionary, Using the In Operator on Tuples, Sets, and Dictionaries, Comparing Collections. **Collection of New Information Object-Oriented Programming:** Understanding a Problem Domain, Function "Isinstance," Class Object, and Class Book, write a Method in Class Book**.**

(10 Hrs)

UNIT 5:

Plugging into Python Syntax: More Special Methods, **Creating Graphical User interface:** Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Introducing few more Widgets, Object-Oriented GUIs, Keeping the Concepts from Being a GUI Mess.

(8 Hrs)

Text Books:

1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Learning with Python: How to Think Like a Computer Scientist Paperback – Allen Downey, Jeffrey Elkner, 2015

Reference Books:

1. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr.
2. Exploring Python, Timothy A. Budd, Mc Graw Hill Education.
3. Python for Informatics: Exploring Information, C harles Severance.
4. Learning Python, Fourth Edition, Mark Lutz, O'Re illy publication

B.Sc.(CS) 6.6-DSC-1F(Pr): PYTHON PROGRAMMING LAB

Programs:

1. a. Write a python program to print "Hello Python"
   b. Write a python program to do arithmetical operations
2. Write a python program to find the area of a triangle
3. Write a python program to solve quadratic equation
4. Write a python program to swap two variables
5. Write a python program to convert Celsius to Fahrenheit
6. Write a python Program to Check if a Number is Odd or Even
7. Write a python Program to Print all Prime Numbers in an Interval
8. Write a python Program to Find the Factorial of a Number
9. Write a python Program to Display the multiplication Table
10. Write a python Program to Multiply Two Matrices
11. Write a python Program to Find LCM & GCD using functions
12. Write a python program to read a word and print the number of letters, vowels in the word.
13. Write a python program to input an array of n numbers and find separately the sum of positive numbers and negative numbers.
14. Write a python program to search an element using linear equation.
15. Write a python program to search an element using binary search
16. Write a python program to insert a number in a sorted array.
17. Write a python program to stimulate stack operation.
18. Write a python program to draw shapes & GUI controls.
19. Write a python programs to using the built-in methods of the string, list and dictionary classes.
20. Write a python program to demonstrate exception handling.

B.Sc.(CS)E 6.2A-DSE-1F: Elective-I: DATA MINING

Total: 48Hrs

UNIT 1:

Data Mining: Introduction, What is data mining, Data Mining Definitions, KDD Vs Data Mining, DBMS Vs Data Mining, Other related areas, DM techniques, Other Mining Problems, Issues and Challenges in DM, DM application areas, DM applications. Data Warehouse: Introduction, What is Data Warehouse, Definition, Multidimensional Data Model, OLAP operations, Warehouse Schema, Data Warehouse Architecture, Warehouse Server, Meta Data, Data Warehouse backend process.

(8 Hrs)

UNIT 2:

Association Rules: Introduction, Association Rule, Methods to discover association rules, a priori algorithm, partition algorithm, pincer-search algorithm(only concept p-84), Decision Trees :Introduction, Decision Tree, Tree Construction Principle, Best Split, Splitting Indices (only definitions of Entropy), Decision Tree Construction Algorithms, CART, ID3.

(10 Hrs)

UNIT 3:

Rough Set Theory: Introduction, Definition (up to -Rough Set p- 210,211), Rough Sets and Fuzzy Sets (concept, definition of rough set member function-p226), Other Techniques :Introduction, Neural Network, Learning in NN, Unsupervised Learning, Genetic Algorithm, Support Vector Machines (Concept).

(10Hrs)

UNIT 4:

Clustering Techniques: Introduction, Clustering Paradigms, Partitioning, Algorithms, k-Medoid Algorithms (PAM concept, Partitioning concepts. p-123), CLARA, Hierarchical Clustering, DBSCAN (concept Only, No definitions. p- 129), Categorical Clustering Algorithms, STIRR (concept excluding example)

(10 Hrs)

UNIT 5:

Web Mining: Introduction, Web Mining, Web Content Mining, Web Structure Mining (exclude example), Web Usage Mining, Text Mining, Unstructured Text, Episode Rule Discovery for Texts. Temporal and Spatial Advanced Data Mining: Introduction, Temporal Data Mining, Temporal Association Rules, Sequence Mining, The GSP Algorithm, Episode Discovery, Spatial Mining.

(10 Hrs)

Text Books:

1. Arun K. Pujari, Data Mining Techniques, , Universities Press India, 4th Edition 2016
2. Han, Jiawei and Kamber, Michelin, Data Mining: Concepts and Techniques. Morgan Kaufman Publishers, 2012.

Reference Books :

1. M Ramakrishna Murthy, Introduction to Data Mining and Soft Computing Techniques, Laxmi Publications Pvt Ltd, 2017.
2. Paul Teetor, R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics, O'reilly Cookbooks, 2011
3. Margaret H. Dunhan: Data mining-Introductory and Advanced Topics, Pearson Education.

B.Sc.(CS)E 6.2B-DSE-1F: Elective-I: MOBILE COMMUNICATIONS

Total: 48 Hours

UNIT 1:

Cellular Concept: Frequency Reuse, Channel Assignment Strategies, Interference and System Capacity, Power Control for Reducing Interference, Trunking and Grade of Service, Improving Capacity in Cellular Systems.

Mobile Radio Propagation: Large Scale path Loss- Free Space Model, Three basic propagation mechanisms, Practical Link Budget Design using Path Loss Models, Outdoor Propagation Models – Okumura, Hata, PCS Extension to Hata Model (explanations only).

(8 Hrs)

UNIT 2:

Mobile Radio Propagation: Small-Scale Fading and Multipath: Small scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions, Statistical Model for Multipath Fading Channels (Clarke‘s Model for Flat Fading only).

(10 Hrs)

UNIT 3:

System Architecture and Addressing: System architecture, The SIM concept, Addressing, Registers and subscriber data, Location registers (HLR and VLR) Security-related registers (AUC and EIR), Subscriber data, Network interfaces and configurations.

Air Interface – GSM Physical Layer: Logical channels, Physical channels, Synchronization- Frequency and clock synchronization, Adaptive frame synchronization, Mapping of logical onto physical channels, Radio subsystem link control, Channel coding,

source coding and speech processing, Source coding and speech processing, Channel coding, Power-up scenario.

GSM Protocols: Protocol architecture planes, Protocol architecture of the user plane, Protocol architecture of the signaling plane, Signaling at the air interface (Um), Signaling at the A and Abis interfaces, Security-related network functions, Signaling at the user interface.

(10 Hrs)

UNIT 4:

GSM Roaming Scenarios and Handover: Mobile application part interfaces, Location registration and location update, Connection establishment and termination, Handover.

Services: Classical GSM services, Popular GSM services: SMS and MMS.

Improved data services in GSM: GPRS, HSCSD and EDGE GPRS System architecture of GPRS , Services , Session management, mobility management and routing, Protocol architecture, Signaling plane, Interworking with IP networks, Air interface, Authentication and ciphering, Summary of GPRS . HSCSD: Architecture, Air interface, HSCSD resource allocation and capacity issues. EDGE: The EDGE concept, EDGE physical layer, modulation and coding, EDGE: effects on the GSM system architecture, ECSD and EGPRS.

(10 Hrs)

UNIT 5:

CDMA Technology : Introduction to CDMA, CDMA frequency bands, CDMA Network and System Architecture, CDMA Channel concept, Forward Logical Channels, Reverse logical Channels, CDMA frame format, CDMA System Operations(Initialization/Registration), Call Establishment, CDMA Call handoff, IS- 95B, CDMA2000, W-CDMA,UMTS, CDMA data networks, Evolution of CDMA to 3G, CDMA 2000 RAN Components, CDMA 2000 Packet Data Service.

(10 Hrs)

Text Books:

1. Theodore Rapport, ―Wireless Communications – Principles and Practice‖, Prentice Hall of India, 2nd Edition, 2007, ISBN 978-8-120-32381-0.
2. Jorg Eberspacher, Hans-Jorg Vogel, Christian Bettstetter, Christian Hartmann, "GSM– Architecture, Protocols and Services‖, Wiley,3rd Edition, 2009,ISBN-978-0-470-03070-7.
3. Gary J Mullet, ―Introduction To Wireless Telecommunications Systems and Networks", Cengage Learning.

B.Sc.(CS)E 6.2C-DSE-1F: Elective-I: DESIGN AND ANALYSIS OF ALGORITHM

Total: 48 Hours

UNIT1:
Introduction: Definition of algorithm, Characteristic of algorithm, Different Control Structures, Writing Structured Programs, Analysis of algorithm. **Divide and Conquer**: General Method, Binary Search, Finding Maximum & Minimum, Merge Sort, Quick Sort, Selection Sort, Strassen's matrix multiplication.

(15 Hrs)

UNIT 2:
Greedy Method: General Method, Knapsack Problem, Job Sequencing with Deadline, Minimum-cost Spanning trees, Optimal Storage on tapes, Optimal Merge Patterns, Single-Source Shortest Paths.

(8 Hrs)

UNIT 3:
Dynamic Programming: Introduction to Graphs, Definition types, Terms related To Graph, General Method, Multistage Graphs, All pair shortest paths, Optimal Binary Search trees, 0/1 –Knapsack, The traveling salesperson problem, Flow Shop Scheduling.

(10 Hrs)

UNIT 4:
Basic traversal & Search techniques: Search & traversal techniques for Trees, Search & traversal techniques for graphs, Code Optimization, AND/OR Graphs, Game trees.

(8 Hrs)

UNIT 5:
Backtracking: General method, The 8-Queens Problem, Sum of subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.

(7 Hrs)

Text Books:

1. Fundamentals of Computer Algorithm, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekarn.
2. Design & Analysis of algorithm-horowitz, Sahni

References Books:

1. The Design & Analysis of Computer Algorithms, Addison Usekey, Alfred V aho, John,E-hopcraft &

B.Sc.(CS)E 6.3A-DSE-2F: Elective-II: COMPUTER VISION

Total: 48 Hours

UNIT 1:

Introduction: Cameras**:** Pinhole Cameras, Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases, Sources, Shadows, and Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models, Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

(8 Hrs)

UNIT 2:

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Edge Detection: Noise, Estimating Derivatives, Detecting Edges, Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

(10 Hrs)

UNIT 3:

The Geometry of Multiple Views: Two Views, Stereopsis: Reconstruction, Human Stereposis, Binocular Fusion, Using More Cameras, Segmentation by Clustering: What Is Segmentation?, Human Vision: Grouping and Getstalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,

(10 Hrs)

UNIT 4:

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness, Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice, Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples.

(10 Hrs)

UNIT 5:

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations, Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization, Model- Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering,

Obtaining Hypotheses Using Invariants, Verification, Application: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.

(10 Hrs)

Text Books:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.

Reference Books:

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.

B.Sc.(CS)E 6.3B-DSE-2F: Elective-II: CYBER SECURITY

Total: 48 Hours

UNIT 1:

Introduction: Cyber Attacks, Defence Strategies and Techniques, Guiding Principles, Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Comma Divisor, Useful Algebraic Structures, Chinese Remainder Theorem, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography – Product Ciphers, DES Construction.

(12 Hrs)

UNIT 2:

Public Key Cryptography and RSA: RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack, Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange, Other Applications.

(12 Hrs)

UNIT 3:

Key Management: Introduction, Digital Certificates, Public Key Infrastructure, Identity–based Encryption, Authentication–I - One way Authentication, Mutual Authentication, Dictionary Attacks, Authentication – II – Centalised Authentication, The Needham-Schroeder Protocol, Kerberos, Biometrics, IPSec Security at the Network Layer – Security at Different layers: Pros and Cons, IPSec in Action, Internet Key Exchange (IKE) Protocol, Security Policy and IPSEC, Virtual Private Networks, Security at the Transport Layer - Introduction, SSL Handshake Protocol, SSL Record Layer Protocol, Open SSL.

(12 Hrs)

UNIT 4:

IEEE 802.11 Wireless LAN Security: Background, Authentication, Confidentiality and Integrity, Viruses, Worms, and Other Malware, Firewalls – Basics, Practical Issues, Intrusion

Prevention and Detection - Introduction, Prevention Versus Detection, Types of Instruction Detection Systems, DDoS Attacks Prevention/Detection, Web Service Security – Motivation, Technologies for Web Services, WS- Security, SAML, Other Standards.

(12 Hrs)

Text Books:

1. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition

Reference Books:

1. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-GrawHill, 3rd Edition, 2015.
2. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition.
3. Cyber Law simplified- Vivek Sood, Mc-GrawHill, 11th reprint , 2013.
4. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindra kumar, Cengage learning.

B.Sc.(CS)E 6.3C-DSE-2F: Elective-II: NETWORK SECURITY

Total: 48 Hours

UNIT 1

CRYPTOGRAPHY: Introduction to Cryptography, Two Fundamental Cryptographic Principles, Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and blockciphers - Modern Block Ciphers: Block ciphers principals.

(8 Hrs)

UNIT 2:

Symmetric-Key Algorithms: DES—The Data Encryption Standard, AES—The Advanced Encryption Standard, Cipher Modes, Other Ciphers, Cryptanalysis, PUBLIC-KEY ALGORITHMS, RSA, Other Public-Key Algorithms, DIGITAL SIGNATURES, symmetric-Key Signatures, Public-Key Signatures, Message Digests, The Birthday Attack.

(14 Hrs)

UNIT 3:

Management Of Public Keys: Certificates, X.509, Public Key Infrastructures, communication security, IPsec, Firewalls, Virtual Private Networks, Wireless Security.

(10 Hrs)

UNIT 4:

Authentication Protocols: Authentication Based on a Shared Secret Key, Establishing a Shared Key: The Diffie-Hellman Key Exchange, Authentication Using a Key Distribution Center, Authentication Using Kerberos, Authentication Using Public-Key Cryptography.

(10 Hrs)

UNIT 5:

Email Security: PGP—Pretty Good Privacy, S/MIME, WEB SECURITY, Threats, Secure Naming, SSL—The Secure Sockets Layer, Mobile Code Security.

(6 Hrs)

Text Books:

1. William Stallings, "Crpyptography and Network security Principles and Practices",Pearson/PHI.
2. Tannenbaum, wetherall, "Computer Networks:, Pearson.

Reference Books:

1. W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing –Prentice Hall of India.

B.Sc.(CS)E 6.4A-DSE-3F: Elective-III: MOBILE APPLICATIONS

Total: 48 Hours

UNIT 1:

Introduction to Mobile Application Development: Preliminary Considerations – Cost of Development –Importance of Mobile Strategies in Business World – Mobile Myths – Third-Party Frameworks. **Mobile Applications**: Mobile Web Presence - Marketing – Web Services for Mobile Devices – Web Services Languages.

(8 Hrs)

UNIT 2:

Mobile User Interface Design: Effective Use of Screen Real Estate – Understanding Mobile Application Users – Understanding Mobile Information Design – Understanding Mobile Platforms. **Mobile Websites:** Choosing a Mobile Web Option – Adaptive Mobile Websites – Dedicated Mobile Websites - Mobile Web Applications with HTML 5.

(10 Hrs)

UNIT 3:

Getting Started with Android: Why Target Android? - Getting the Tools You Need , Anatomy of an Android Application Android User Interface: Understanding Components of a Screen – Adapting to Display Orientation – Managing Changes to Screen Orientation – Creating User Interface Programmatically – Listening for UI Notifications.

(10 Hrs)

UNIT 4:

Types of Views: Designing Your User interface using Views – Displaying Pictures and Menus with Views – AnalogClock and DigitalClock Views Data Persistence: Saving and loading user Preferences - Persisting data to files – Creating and using Data bases– Content Providers

(10 Hrs)

UNIT 5:

Android Messaging and Networking: SMS Messaging – Sending SMS – Receiving SMS - Sending E-mail Location Based Services: Displaying Maps – Obtaining Map API Key – Displaying the Map – Zoom Control – Changing Views – Navigating – Adding Markers – Getting the Location that was Touched – Geocoding and Reverse Geocoding .

(10 Hrs)

Text Books:

1. Professional Mobile Application Development, Jeff McWherter and Scott Gowell,2012, Wrox Publishers.
2. Beginning Android Application Development, Wei – Meng Lee, Wiley, 2011.

Reference books:

1. Professional Android 4 Application Development, Reto Meier, Wrox Publications, 2012.
2. Beginning iOS6 Development: Exploring the iOS SDK, David Mark, Jack Nutting, Jeff LaMouche, and Fredric Olsson, Apress, 2013.
3. Android in Practice, Charlie Collins, Michael Galpin and Matthias Kappler, Dream Tech, 2012

B.Sc.(CS)E 6.4B-DSE-3F: Elective-III: CLOUD COMPUTING

Total: 48 Hours

UNIT 1:

Cloud Computing Basics: Overview, Applications, Intranet and the Cloud, First Movers in the Cloud; The Use of Cloud Computing, Benefits, Security concerns, regulatory issues; Overview of different cloud computing applications that are implemented; Business case for implementing a Cloud: Cloud Computing Services, Applications help to the business, deleting the datacenter, Saleforce.com, Thomson Reuters.

(10 Hrs)

UNIT 2:

Cloud Computing Technology: Hardware and Infrastructure: Clients, Security, Network, Services; Accessing the Clouds: Platforms, Web applications, Web APIs, Web Browsers.

(8 Hrs)

UNIT 3:

Cloud Storage: Overview, Cloud Storage providers, Standards: Applications, Client, Infrastructure, Services.

(8 Hrs)

UNIT 4:

Cloud Computing at Work: Software as a service: Overview, Driving Forces, Company offerings, Industries; Software plus services: Overview, Mobile Device Integration, Providers, Microsoft Online; Developing Applications: Google, Microsoft, Intuit QuickBase, Cast Iron Cloud, Bungee Connect, Development: Google, Sales Force, Azure.

(12 Hrs)

UNIT 5:

Local Clouds and Thin Clients: Virtualization, server solutions, Thin Clients; Migrating to the clouds: Cloud services for individuals, Cloud services aimed at Mid-market, and Enterprise-Class, Migration; Best practices and the future of Cloud computing: analyzing the services, Best practices, How Cloud Computing might evolve.

(10 Hrs)

Text Books:

1. Cloud Computing a Practical approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, Tata McGraw-HILL, 2010 Edition.

Reference Books:

1. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, S. Thamari Selvi, McGraw Hill Education (India) Private Limited.
2. Distributed and Cloud Computing, Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Morgan Kaufmann Publishers 2012.
3. Cloud computing, Barrie Sosinsky, Wiley India.
4. Cloud Computing, Kumar Saurabh, 2nd Edition, Wiley, India

B.Sc.(CS)E 6.4C-DSE-3F: Elective-III: SYSTEM PROGRAMMING

Total: 48 Hrs

UNIT 1:

Background: Machine Structure, Evolution of the Components of a Programming System. Assembler, Loaders, Macros, Compilers, Formal Systems, **Machine Structure:** General Machine Structure, Instruction format, Representation of 360/370 instructions, Machine Language and Assembly Language.

(12 Hrs)

UNIT 2:

Assemblers: General design procedure, design of Assembler, statement of problem, data Structure, Format of Date bases, Algorithm for pass 1 and pass 2, look for modularity, Explanation along with flowcharts for both pass 1 and pass 2 (detail flowchart).**Table Processing**: Searching & Sorting - Linear and binary search, comparison, examples. Interchange sort, shell sort, bucket sort, radix exchange sort, address calculation sort, Random entry searching.

(9 Hrs)

UNIT 3:

Macro Language and The Macro Processor: Introduction, Macro instructions, Features of macro facility-macro instruction arguments, Conditional macro Expansion, Macro calls within macro, Macro instruction defining macro implementation: statement of problem, Specification of databases and specification of database format, Algorithm and flowchart for processing macro definitions and macro expansion.

(9 Hrs)

UNIT 4:

Loaders: Introduction, Loader schemes-compile and go loader scheme, general loader, Absolute loader, Sub routine linkage, Relocating loader, Direct linking loader, overlays, Dynamic loading.

(9 Hrs)

UNIT 5:

Compilers: Introduction, Statement of problem, Phases of compiler, Lexical phase, syntax phase, interpretation phase optimization phase, storage assignment phase, code generation phase, Assembly phase, passes of compiler. Data Structures: statement of problem, storage classes and its use.

(9 Hrs)

Text Books:

1. John J. Donowon, System Programming, TATA McGraw Hill.
2. Beck: System Software, 3/e Pearson Education.
3. System Software – Leland L. Beck, Third edition, Addison Wesley 1997

Reference Books:

1. Dhamdhere: System Programming and Operating System TMH Laudon & Laudon, Management Information Systems, 8/e Pearson Education

B.Sc.(CS) 6.5-SEC-1F: MINI PROJECT-II

Theory, Practical and Project Examination Scheme

Question Paper Pattern for all semester except AECC

1. Question number 1-12 carries 2 marks to answer any 10 questions : **20 Marks**
2. Question number 13-21 carries 5 marks to answer any 6 questions : **30 Marks**
3. Question number 22-26 carries 10 marks to answer any 3 questions : **30 Marks**

Total: 80 Marks

Practical Evaluation Scheme

Practical Examination- 40 Marks **Duration - 3 Hours**.

Certified Journal is compulsory for appearing Practical Examination, students shall be given two programming assignments taking into consideration of duration of the time allotted to students for writing, typing and executing the programs.

Algorithm/Program writing : **14 Marks (7 Marks each)**
Execution : **16 Marks (8 Marks each)**
(Includes program code correctness and correct execution results)
Journal : **05 Marks**
Viva-Voce : **05 Marks**

Total : 40 Marks

Execution of the Project:

- The students are required to carry out the project in a group of two students under the guidance of course teacher.
- Project work problem statement shall be identified by the students with the help of the course teachers and students shall submit the synopsis/project proposal of the same during the second week of the commencement of V and VI semester B.Sc.(CS) programme.
- During project development students are expected to define a project problem, do requirements analysis, systems design, software development, apply testing strategies and do documentation with an overall emphasis on the development of a robust, efficient and reliable software systems.
- No change in the title of the project work shall be allowed after 3rd week of the commencement of V and VI semester B.Sc.(CS) programme.
- The project development process has to be consistent and should follow standards identified by the guide monitoring the project work.
- There is no restriction on use of hardwares and softwares for carrying out the project work except that ready application packages are not allowed.
- The students have to submit the project dissertation of the project work carried out in one hard copy along with soft copy written on compact disc.

Project Evaluation Scheme : Main Examination

Max. Marks: 40 **Time: 3 Hours**

1. Dissertation/Project Report evaluation : **20 Marks**

2. Presentation/Demo of the application developed : **10 Marks**
(navigation of the application, features incorporated, data validation, UI, reports, etc.)

3. Viva-voce : **10 Marks**

Total : 40 Marks

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KARNATAK UNIVERSITY

DHARWAD

Regulations and Syllabus

for the Programme

BACHELOR OF COMPUTER APPLICATIONS (BCA)

(I TO VI Semester)

Revised Syllabus

As Discipline Specific Course (DSC)

Generic Elective (GE) and

Skill Enhancement Course (SEC)

Under

Choice Based Credit System

From 2020-21 and Onwards

Regulations Governing Under – Graduate Programmes in the

Faculty of Science & Technology under Choice Based Credit System

(As per Section 44(1)(c) of K.S.U. Act 2000)

1. TITLE AND COMMENCEMENT

d. These regulations shall be called "Regulations governing the acts of the Choice Based Credit System (CBCS) for under graduate programmes (General)" of Karnatak University, Dharwad.
e. These regulations shall be as per section 44(1)(c) of K.S.U. Act 2000 for introduction of courses.
f. As per Section 44(3) of K.S.U. Act 2000, these Regulations shall come into effect from the academic year: 2020-21 after H.E. the Chancellor's assent.

The sections with titles of Regulations for Under Gradate Programmes (General)

2. UNDER GRADUATE PROGRAMME (U. G. Degrees)

Bachelor of Computers Applications (**B.C.A**.): 06 semesters

3. PROGRAMME STRUCTURE

3.1: BCA programme shall have three components, Viz., Discipline Specific Courses (DSC), Elective Courses (EC), and Ability Enhancement Courses (AEC) as given in Annexures-1 (Course means subject/paper).

d. DSC: DSC are compulsory core courses of the programme.

e. EC: Elective courses may have three categories' viz., Discipline Specific Elective (DSE) Course, Dissertation/Project and Generic Elective (GE) Course.

iii. DSE: Elective courses offered under the main discipline/subject of study are referred to as Discipline Specific Elective (DSE).

iv. Dissertation/Project: An elective course designed to acquire special/ advanced knowledge, such as supplement study/support study to a project work, and a candidate study such a course on his/her own with an advisory support by a teacher/faculty member is called Dissertation/project.

f. Ability Enhancement Courses (AEC): The Ability Enhancement Courses (AEC) may be of two kinds: i) Ability Enhancement Compulsory Courses (AECC) and ii) Skill Enhancement Courses (SEC).

iii. Ability Enhancement Compulsory Courses (AECC): Environmental Science, Indian constitution, English Communication and Modern Indian languages (MIL) Communications.

P.S:. 1) A deaf / spastic /mentally retarded/learning deficiency student shall be exempted from learning any one of the languages like English or MIL.
2) MIL means any one language mentioned in VIII schedule of Indian Constitution.

iv. Skill Enhancement Courses (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain theory and lab/hands-on training/ fieldwork .

3.2: Programme shall have two components (L: T/P): i) Lecturing (L) and ii) Tutorial (T) for non practical subjects and Practical (P) for practical subjects. Tutorial consists of participatory discussions, seminar presentations, desk work etc by the students of the respective subjects.

P.S: There shall not be a tutorial for Practical subjects

3.3: Credit system of the programme: BCA programme shall have 144 credits for 06 semesters. Credit means the unit by which a course is measured.

c. 1 hour lecture or 1 hour tutorial of session per week is equal to 1 credit and that of 2 hours practical is equal to 1 credit. Credit for each course shall be decided by BoS.

d. Course (subject) of 3 to 6 credits each shall be evaluated for 100 marks and that of less than 3 credits including practical shall be evaluated for 50 marks. Further, the project work /dissertation shall have 2 credits and be evaluated for 50 marks.

4: WORKLOAD FOR TEACHERS

4.1: Each theory session may have 40 students extendable to 45 students for BCA program Irrespective of DSC, DSE, SEC, and AEC in the class rooms.

4.2: There shall be one teacher for first 15 students, 02 teachers up to 27, 03 teachers up to 36 and 4 teachers up to 46 students in a practical batch.

4.3: In general there shall be

iv. One hour theory class per week is equal to one hour work load per week.
v. One hour tutorial per week is equal to one hour work load per week.
vi. One hour practical class per week is equal to one hour work load per week.

5. ADMISSION PROCEDURE FOR BCA PROGRAMME

5.1: Invitation of Applications: University shall issue a notification for admission to various U G Programmes for all odd semesters soon after declaration of PUC II year / 10+2 results,

e. Notification shall include eligibility for admission to different programmes, detailed fee structure, calendar of academic events for odd and even semesters of the academic year, last date for admission with or without panel fees, remittance of fees to University etc.
f. Admissions shall be purely based on merit cum reservation as per the norms of Government of Karnataka issued from time to time.
g. Academic year normally commences in the month of June every year. Exact date for commencement of academic year shall be decided by the University.
h. Affiliated colleges shall admit the students for each programme not exceeding the approved number of students. Hence, prior approval in this connection from University is mandatory.

5.2: ELIGIBILITY:

A candidate who has passed two years Pre University Course (PUC) Examination conducted by Pre University Board, Government of Karnataka, Bengaluru or 10+2 Examination conducted by CBSE or equivalent examinations by other states or any other recognized Boards / Departments shall be eligible for admission to first semester BCA Programme. Further,

b. For B.C.A. Programme, a candidate of PUC / 10+2 with Science or commerce with Mathematics / Business Mathematics / Accountancy/ Computer Science or 3 years Diploma with Computer Science / information Science or 2 years JOC / ITI with Computer Science shall be eligible.

5.3: Admissions for higher Semesters:

h. BCA Programme shall be carryover system.

i. 75% attendance shall be mandatory for each semester and for each paper to appear for semester end examination. Further, 20% attendance shall be condoned for the students involved in co curricular/ curricular activities through NCC/NSS/ Sports/ Cultural activities/ Study tours/ field work/ attending seminars with the due permission from the Principal in writing.

j. A candidate shall be eligible to move to higher semester even if the candidate passes / fails in such semester end examination conducted by the University.

k. If the candidate fails to appear for the semester end examination but make application to appear for the examination by maintaining 75 % attendance is also eligible to get the admission to immediate next higher semester admission.

P.S: 1) Mere submission of application by the candidate to appear for examination without maintaining 75% attendance shall not be eligible for higher semester. 2) If candidate maintains 75% attendance but fails to submit the application to appear for semester end examination shall not be eligible for higher semester admission.

l. If the candidate appears for I semester end examination and discontinued for II semester and wishes to take admission for II semester in future, such candidates shall not be allowed for II semester directly. Such candidate shall again get the admission to I semester only by surrendering his/her I semester marks card to University. This is also applicable to other even semesters like IV and VI semesters wherein candidate shall get admission to III semester and V if discontinued to IV and VI semesters respectively.

m. If the candidate appears for II semester end examination and discontinued for III semester and wishes to take admission for IV semester in future, such candidates shall not be allowed for IV semester. Such candidate shall again get the admission to III semester as per University schedule. This is also applicable to other odd semester like V semester wherein candidate gets admission to V semester if discontinued at VI.

n. A candidate who does not satisfy the requirement 75% attendance even in one course (subject / paper) shall not be permitted to take the whole University examination of that semester and he/she shall seek re-admission to that Semester in a subsequent year as per University schedule.

5.4: Medium of instruction: English

5.5: Change of Programme:

Every U. G. Programme is specific in nature and hence, there shall not be any provision to change the programme.

5.6: Change of subject:

The MIL subject studied by the candidate in I semester shall be the same for all other semesters and hence, there shall not be any provision to change the MIL subject.

5.7: Change of College/ Transfer

d. Candidate shall be permitted for change of college only for the odd semesters by admitting within the stipulated period mentioned in the admission notification with the due consent from both the colleges. There shall not be any provision for

transfer / change of college for even semesters. Further, lower semester examination failure / MPC candidates are not eligible for transfer / change of college within the Karnatak University's affiliated colleges.

e. The same shall be applicable for the candidate seeking transfer from the colleges of other University within or outside the state or country by producing the eligibility certificate issued by Karnatak University with the confirmation of similarity of the programmes with each other. Other conditions shall be same as in 5.7(a).

f. Such transfer of admission shall be within the intake capacity of the respective class/ subject of the respective College.

6: EXAMINATION

6.1: Course (subject) of 3 to 6 credits each shall be evaluated for 100 marks and that of less than 3 credits including practical shall be evaluated for 50 marks. Further, the project work /dissertation shall have 6 credits and be evaluated for 100 marks.

6.2: There shall be a continuous assessment mode for the student. For this purpose, semester examinations are divided in to two components viz.,

c. Internal assessment written examinations conducted at college level for 20% of maximum marks allotted for each course (paper/subject) and

d. Semester end written examination conducted by University after 16th week of the commencement of every semester for 80% of maximum marks allotted for each course (paper/subject).

6.3: Internal assessment (IA) examinations:

g. **Theory Papers:** The College shall conduct IA examination for theory subjects in the 8th week for 10% and 12th week for remaining 10% of maximum marks allotted for each paper/subject. Duration of examination shall be 1hr. each.

h. **Practical:** The College shall conduct IA examination for practical paper in the 14th week for 20% of maximum marks allotted for each paper/subject. Duration of examination shall be 3hr.

i. **Project work /dissertation:** The College shall conduct IA examination for Project work /dissertation in the 14th week for 20% of maximum marks allotted for each Project work /dissertation. Duration of examination shall be 1hr.

j. Concerned teacher shall display the marks on notice board within 4 days after IA examination and allow the student for verification of IA Booklet if he wishes.

Grievances, if any, shall be solved by the concerned teachers, further if any by the Principal/ representative of Principal as per internal mechanism of the College.

k. There shall not be any provision for makeup examination for IA examinations for improvement of IA marks or for remaining absent. However, IA exam shall be conducted for the students who remained absent due to participation in the events related to co curricular / curricular activities conducted by recognized organizations.

l. College shall submit the IA marks to the University if student satisfies 75% attendance in the semester and shall be eligible to appear for semester end examination.

6.4: Semester end examination:

Semester end examination shall be conducted by University after 16th week of the commencement of every semester for 80% of maximum marks allotted for each paper. Further, the University shall conduct the semester end examination of the respective semesters only; may be odd or even but not both odd and even semesters simultaneously unless specified otherwise.

j. Duration of theory examination shall be 03 hours for 100 marks subject/ paper/ course (including IA marks) having the credit 3 to 6.

k. Duration of theory examination shall be 1.5 hours for 50 marks subject /paper / course(including IA marks) having the credit less than 3.

l. Duration of practical examination shall be 3 hours for 50 marks subject /paper / course(including IA marks) having the credit less than 3.

m. BoS in consultation with the concerned faculty shall decide the pattern of question paper for uniformity for all the core courses and elective courses.

n. Question papers shall be prepared by team of members of respective Board of Examiners (BoE).

o. Concerned BoE shall decide the scheme of valuation of both theory and practical course papers.

p. There shall be a single valuation for theory papers from the members of concerned BoE under the supervision of moderator who is in turn under the supervision of Chairman of BoE.

q. Practical / evaluation of project / dissertation work shall be conducted before the commencement of theory examination at the concerned colleges by two

examiners; one from the same college as internal examiner and other from other colleges appointed by University as external examiner. Further, there may be two external examiners but not two internal examiners to conduct the examination. A pair of examiners shall conduct practical examination for two batches par day having maximum 12 students in each batch.

6.5: Passing criteria

d. Candidate has to score 40% in each course (subject) including the IA marks for passing the course (subject) subject to the condition that:

iv. No minimum marks or separate passing for the IA examination, but candidate has to score minimum 40% from the semester end examination for its 80% of the maximum marks and fulfils the minimum 40% for maximum marks of the course (subject) (Ex. for 100 marks paper; 20 IA + 80 sem end exam and hence, minimum 32 marks for sem end exam). If candidate scores 40% by cumulating marks from IA and semester end examination but fails to score 40% from the semester end examination, such candidate shall be declared fail.

v. If the course (subject) is having both theory and practical, candidate has to pass both theory and practical independently. If the candidate fails in Practical and passes in theory examination, such candidate shall reappear for practical examination only and vice versa.

vi. In all cases of failure in particular course (subject), IA marks shall be protected and carried forward; and the candidate need not reappear for IA examinations in such cases.

e. On successful scoring of minimum 40% in all courses (Subject), the candidate shall be declared pass in the programme in that semester.

f. On successful scoring of minimum 40% in all courses (Subject) and all the semesters, the candidate shall be declared pass in the entire programme.

6.6: Percentage and Grading

f. If P is the percentage of marks secured (IA + semester end score) by the candidate in a course(subject) which is rounded off to the nearest integer, the grade(G) earned by the candidate in that course(subject) will be given as below:

Percentage(P)	Grade(G)	Percentage(P)	Grade(G)
40 – 49	5.0	75 – 79	8.0
50 – 59	6.0	80 – 84	8.5
60 – 64	6.5	85 – 89	9.0
65 – 69	7.0	90 – 94	9,5
70 – 74	7.5	95 – 100	10.0

Grade point of less than 5 shall be considered as fail in the course (subject). Hence, P=0 and G=0 for the absent also.

g. A student's level of competence shall be categorized by grade point (GP), Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) of the programme.

h. Semester Grade Point Average (SGPA): The SGPA is a ratio of sum of the number of Credit grade points scored from all the courses (subject) of given semester to the total credits of such semester in which the candidate studied. (Credit grade points of each course (subject)= Credit x GP)

i. Cumulative Grade Point Average (CGPA): It is calculated as below for 6 semester programme:.

$$CGPA = \frac{\{(Credit_1 * SGPA_1) + (Credit_2 * SGPA_2) + (Credit_3 * SGPA_3) + (Credit_4 * SGPA_4) + (Credit_5 * SGPA_5) + (Credit_6 * SGPA_6)\}}{\text{Total credits of programme (sum of credits of all semesters)}}$$

j. After studying and passing all the credits prescribed for the programme the degree shall be awarded with CGPA score and class distinguishing as second class, first class, and distinction along with grade letter as under.

CGPA of the Programme (UG)	Class Obtained	Grade Letter
9.50 to 10.00	Distinction	A++
9.00 to 9.49		A+
8.00 to 8.99		A
7.00 to 7.99	First Class	B+
6.00 to 6.99		B
5.00 to 5.99	Second Class	C
Less than 5.00	Fail	D

6.7. CRITERIA FOR AWARD OF DEGREE

On successful scoring of minimum 5 grade points in all courses of the programme, the respective degree shall be awarded for the candidates. The University shall issue the final grade card (Marks card) consisting of grade points along with marks of all courses successfully completed, SGPA for all the semesters, CGPA with Grade letter of the entire programme and Class obtained.

The degree shall be awarded in the Annual / Special convocation. The Degree certificate shall consist of CGPA of the programme and Class obtained.

6.8: Recounting, revaluation, challenge valuation, photo copying of answer papers

There shall be provision for recounting of marks, revaluation, challenge valuation and photo copying of answer papers. The University shall invite applications for such purpose immediately after announcing the results for every semester by giving 10 days time to apply for the same online as per the existing ordinance and regulations and process the same accordingly.

6.9: Rank and Gold medals.

Students shall be considered for Ranks and/or Gold medals for only those who are completing all the credits in 6 semesters (6 semesters Programme) without break in the examination. However, this is not applicable for the award of classes like, second/first class/ distinction to the students.

6.10: Makeup Examination.

d. There shall be no immediate makeup examination for all semesters to the courses where candidate failed to score minimum 40% for semester end examination unless specified otherwise as in (c).
e. However, such candidate shall appear for examination during the regular schedule of examination conducted by the University.
f. There shall be a makeup examination for the V and VI semesters immediately after declaring the final semester results of the programme.

7: Provision for improvement of the marks (Grade Point)

Improvement of the marks (Grade Point): There shall be a provision for candidates to reappear for the examination for the concerned course of theory papers only (subject) in which candidate wishes for improvement of his/ her grade point of SGPA in general and CGPA in total of the programme subject to the condition that:

f. The candidate shall be eligible to reappear for improvement of grade points only after successfully passing the programme.

g. The candidate may opt for the examination for any number of courses (subject / paper) of the programme for improvement of grade point but not more than three times for each course (subject / paper) as per the prevailing syllabus of the examination conducted in the regular schedule of University examinations.

h. All such provisions are there within 03 years from successful completion of the programme but not exceeding the period of double the duration of completion of the programme.

i. In all such cases grade points are considered if there is a progress in such improvements, otherwise original grade points shall be retained.

j. No such candidates shall be eligible for the award of Rank, Gold Medal, Cash Prize, etc.

8: Duration for completion of the U. G. Programme

Minimum duration for completion of BCA UG Programme shall be 3 years from the date of admission to I semester, but the maximum duration shall be 6 years, i.e., double the duration of programme.

9: REPEAL AND SAVINGS FOR UG PROGRAMMES

All the existing Regulations governing three years Bachelor degree programme in the discipline of Science under semester or any ordinances or regulations or guidelines issued or adopted earlier by the University in this matter for constituent and affiliated colleges of Karnatak University are hereby repealed. However, the above Regulations shall continue to be in force for the students who have been admitted to the degree programme concerned before the enforcement of these new regulations.

Provided that the said repeal shall not affect the previous operation of the said regulations / ordinances or anything duly done or suffered there under or affect any right, liability or obligation acquired, accrued or incurred under the said regulations.

10: Removal of Difficulties:

Any issue not specifically mentioned in these Regulations shall be decided by the Vice Chancellor as per K.S.U 2000 Act.

BCA Programme structure under CBCS

Semester	*Core			Elective			Ability Enhancement Course						Total Credits
	DSC			**DSE			SEC			AECC			
	Course	L+T+P	Credit	Course	L+T+P	Credit	Course	L+T+P	Credit	Course	L+T+P	Credit	
I	DSC-1A	4+0+4	4+2=6							English-1	2+1+0	2+1=3	26
	DSC-2A	4+0+4	4+2=6							MIL-1	2+1+0	2+1=3	
	DSC-3A	4+2+6	4+2=6							ENVIRONMENTAL SCIENCE	2+0+0	2+0=2	
II	DSC-1B	4+0+4	4+2=6							English-2	2+1+0	2+1=3	26
	DSC-2B	4+0+4	4+2=6							MIL-2	2+1+0	2+1=3	
	DSC-3B	4+2+0	4+2=6							CONSTITUTION OF INDIA	2+0+0	2+0=2	
III	DSC-1C	4+0+4	4+2=6							English-3	2+1+0	2+1=3	26
	DSC-2C	4+0+4	4+2=6							MIL-3	2+1+0	2+1=3	
	DSC-3C	3+1+0	3+1=4										
	DSC-4C	3+1+0	3+1=4										
IV	DSC-1D	4+0+4	4+2=6							English-4	2+1=0	2+1=3	26
	DSC-2D	4+0+4	4+2=6							MIL-4	2+1=0	2+1=3	
	DSC-3D	3+1+0	3+1=4										
	DSC-4D	3+1+0	3+1=4										
V	DSC-1E	4+0+2	4+2=6	DSE-1E	3+1+0	3+1=4	SEC-1E	0+0+4	2				20
				DSE-2E	3+1+0	3+1=4							
				DSE-3E	3+1+0	3+1=4							
VI	DSC-1F	4+0+2	4+2=6	DSE-1F	3+1+0	3+1=4	SEC-1F	0+0+4	2				20
				DSE-2F	3+1+0	3+1=4							
				DSE-3F	3+1+0	3+1=4							
TOTAL			88			24			04			28	144

L+T+P= Lecturing in Theory + Tutorial + Practical Hours per Week (no tutorial for practical subject).

* Each semester may have more than three core (DSC) subjects but not exceeding 18 credits for each semester.

** Each DSE shall have at least two papers and student shall choose any one paper from each DSE.

Bachelor of Computers Applications (BCA)
Programme structure under CBCS; Effective from 2020-21

SYLLABUS

SEMESTER - I

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
AECC	BCA-1.1	English – 1	3	3	45	3	20	80	100
AECC	BCA-1.2	MIL -1	3	3	45	3	20	80	100
AECC	BCA-1.3	Indian Constitution	2	2	30	1.5	10	40	50
DSC	BCA-1.4	Computer Concepts & C-Programming	4 + 0	4	48	3	20	80	100
DSC	BCA-1.5	Introduction to Linux	4 + 0	4	48	3	20	80	100
DSC	BCA-1.6	Fundamentals of Mathematics	4 + 2	6	48	3	20	80	100
DSC	BCA-1.7	C-Programming LAB	2	4	48	3	10	40	50
DSC	BCA-1.8	Linux LAB	2	4	48	3	10	40	50
	Total		26	30			130	520	650

SEMESTER -II

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
AECC	BCA-2.1	English – 2	3	3	45	3	20	80	100
AECC	BCA-2.2	MIL -2	3	3	45	3	20	80	100
AECC	BCA-2.3	Human Rights & Env. Studies	2	2	30	1.5	10	40	50
DSC	BCA-2.4	Fundamentals of Algorithms	4 + 0	4	48	3	20	80	100
DSC	BCA-2.5	Numerical & Statistical Methods	4 + 0	4	48	3	20	80	100
DSC	BCA-2.6	Fundamentals of Digital Logic	4 + 2	6	48	3	20	80	100
DSC	BCA-2.7	Algorithms LAB	2	4	48	3	10	40	50
DSC	BCA-2.8	Numerical & Statistical Methods LAB	2	4	48	3	10	40	50
	Total		26	30			130	520	650

SEMESTER -III

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
AECC	BCA-3.1	English – 3	3	3	45	3	20	80	100
AECC	BCA-3.2	MIL – 3	3	3	45	3	20	80	100
DSC	BCA-3.3	Data Structures using C	4 + 0	4	48	3	20	80	100
DSC	BCA-3.4	OOP with C++	4 + 0	4	48	3	20	80	100
DSC	BCA-3.5	Introduction to Operating System	3 + 1	4	48	3	20	80	100
DSC	BCA-3.6	Data Communications	3 + 1	4	48	3	20	80	100
DSC	BCA-3.7	Data Structures LAB	2	4	48	3	10	40	50
DSC	BCA-3.8	CPP LAB	2	4	48	3	10	40	50
	Total		26	30			140	560	700

SEMESTER -IV

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
AECC	BCA-4.1	English - 4	3	3	45	3	20	80	100
AECC	BCA-4.2	MIL – 4	3	3	45	3	20	80	100
DSC	BCA-4.3	Data Base Management System	4 + 0	4	48	3	20	80	100
DSC	BCA-4.4	Programming in JAVA	4 + 0	4	48	3	20	80	100
DSC	BCA-4.5	Software Engineering	3 + 1	4	48	3	20	80	100
DSC	BCA-4.6	System Programming	3 + 1	4	48	3	20	80	100
DSC	BCA-4.7	DBMS LAB	2	4	48	3	10	40	50
DSC	BCA-4.8	JAVA LAB	2	4	48	3	10	40	50
	Total		26	30			140	560	700

SEMESTER - V

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
DSC	BCA-5.1	Web Programming	4 + 0	4	48	3	20	80	100
*DSE	BCA-5.2	Core Elective – I	3 + 1	4	48	3	20	80	100
*DSE	BCA-5.3	Core Elective – II	3 + 1	4	48	3	20	80	100
*DSE	BCA-5.4	Core Elective – III	3 + 1	4	48	3	20	80	100
SEC	BCA-5.5	Mini Project – I	2	4	48	3	10	40	50
DSC	BCA-5.6	Web Programming LAB	2	4	48	3	10	40	50
	Total		20	24			100	400	600

Note: Each DSE shall have three papers, Student shall opt any one paper from each DSE

List of Core Elective - I

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	BCAE – 5.2 A	Management Information System
2	BCAE – 5.2 B	Managerial Economics
3	BCAE – 5.2 C	Decision Support System

List of Core Elective - II

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	BCAE – 5.3 A	Computer Graphics
2	BCAE – 5.3 B	Computer Networks
3	BCAE – 5.3 C	Object Oriented Analysis & Design

List of Core Elective - III

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	BCAE – 5.4 A	Artificial Intelligence
2	BCAE – 5.4 B	Introduction to Machine Learning
3	BCAE – 5.4 C	Internet of Things (IoT)

SEMESTER -VI

Course	Paper Code	Paper Title Theory/Practical	Credits	No. of Hrs/ Week Theory/ Practical	Total Hours	Duration of Exam in Hrs Theory/ Practical	Internal Assessment Marks Theory/ Practical	Marks for Final Exam Theory/ Practical	Total Marks
DSC	BCA-6.1	Python Programming	4 + 0	4	48	3	20	80	100
DSE	BCA-6.2	Core Elective – I	3 + 1	4	48	3	20	80	100
DSE	BCA-6.3	Core Elective – II	3 + 1	4	48	3	20	80	100
DSE	BCA-6.4	Core Elective – III	3 + 1	4	48	3	20	80	100
SEC	BCA-6.5	Mini Project – II	2	4	48	3	10	40	50
DSC	BCA-6.6	Python Programming LAB	2	4	48	3	10	40	50
	Total		20	24			100	400	600

Note: Each DSE shall have three papers, Student shall opt any one paper from each DSE

List of Core Elective - I

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	BCAE – 6.2 A	Data Mining
2	BCAE – 6.2 B	Mobile Communications
3	BCAE – 6.2 C	Design and Analysis of Algorithms

List of Core Elective - II

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	BCAE – 6.3 A	Computer Vision
2	BCAE – 6.3 B	Cyber Security
3	BCAE – 6.3 C	Network Security

List of Core Elective - III

Sl. No.	Elective Courses Code	Core Electives (One of the following elective to be chosen)
1	BCAE – 6.4 A	Mobile Applications
2	BCAE – 6.4 B	Cloud Computing
3	BCAE – 6.4 C	Operation Research

SEMESTER -I

BCA-1.1-AECC-1: ENGLISH-1

(English-I – Syllabus is decided by respective BoS)

BCA-1.2- AECC-2: MIL-1

(MIL – Syllabus is decided by respective BoS)

BCA-1.3- AECC-3: INDIAN CONSTITUTION

(Indian Constitution – Syllabus is decided by respective BoS)

BCA-1.4 - DSC-1A: COMPUTER CONCEPTS AND 'C' PROGRAMMING

Total: 48 Hrs

UNIT 1:

Computer Concepts: Block diagram of computer system, Central Processing Unit (CPU), ALU, CU, Main memory, Input/Output Unit, Input devices:- Keyboard, Mouse, Light pen, Joystick, Scanner, Digitizer. Output devices- Various types of printers, Plotters, Software: System software, Operating System, Application Software, Machine level language, Assembly language, high level programming, Assemblers, compilers and editors, Merits and demerits of all the languages.

(4 Hrs)

UNIT 2:

Computer Programming: Basics Programming concepts- Algorithm, Flowchart. **Overview of C:** Introduction, Importance of C, Sample 'C' programs, Basic structure of C programming, Programming Style, Executing a 'C' program **Data Types in C:** C tokens, Keywords, Identifiers, Constants, Variables, Data types, Declaration of variables, Assigning values to variables, Defining symbolic constants, Simple Programs.

Input and Output statements: Input and Output statements, Reading character, Writing character, formatted input, formatted output statements**.**

(13 Hrs)

UNIT 3:

Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and Decrement operators, Conditional operators, Bitwise operators, Special operators, Type Conversion in expressions, Operator precedence, Mathematical functions**. Branching and Looping:** Simple 'if' statement, Simple, Nested, Ladder 'if–else' statement. The 'Switch' statement, The ?; operator, GOTO statement, The 'While' statement, 'do-while' statement, 'for' statement, Simple programs on branching and looping.

(11 Hrs)

UNIT 4:

Arrays: Introduction, One dimensional, Two dimensional and Multi dimensional arrays. Initialization of arrays. **Handling of Character Strings:** Declaring and Initializing string variables, reading string from terminal, writing string to screen, Arithmetic operations on characters, putting strings together, Comparison of two strings, string handling functions: strlen, strcpy, strcat, strcmp.

(8 Hrs)

UNIT 5:

Functions: Definition of function. Return values and their types, Function calls, Function declaration, Categories of function explanation with example, Nesting of function, Recursion, Faction with arrays. Structure and Union: Introduction, Defining Structure, declaring structure variables and structure members, arrays as structure, arrays within structure, Union. Pointers: Understanding Pointers, Accessing the address of variables, Declaring and initializing pointers, Accessing a variable through its pointers.

(12 Hrs)

Text Books:

3. Balaguruswamy: Programming in ANSI C, Tata Mc Graw-Hill.
4. Brian W. Kernighan and Dennis M. Ritchie: The C Programming Language, PHI

Reference:

6. V. Rajaraman: Fundamentals of Computers, PHI(EEE).
7. Kamthane, Programming with ANSI and Turbo C, Pearson Education, Asia.
8. Herbert Schildt: C. The complete reference, 4th edition.
9. Yeshwant Kanetkar: Let us C, BPB Publications.
10. Rajesh Hongal: Computer Concepts and C Programming.

BCA-1.5- DSC-2A: INTRODUCTION TO LINUX

Total: 48 Hrs

UNIT 1:

Introduction to Unix: Brief History, What is Unix?, Unix Components, Using Unix, Commands in Unix, Some Basic Commands, Getting Help, Command Substitution, Giving Multiple Commands, Aliases.

(8 Hrs)

UNIT 2:

Files and File Organization: Unix Files, Categories of Files, Hidden Files, File System, Path Names, Home Directory, Directory Commands, File Related Commands, Wild Cards, Displaying the Contents of a File, Printing of Files, Comparing Files.

File Attributes and Permissions: Ownership of Files, File Attributes, File Command, Changing File Permission, Changing the Owner of a File, Changing the group of a File, Times Associated with a File, umask Command.

(10 Hrs)

UNIT 3:

The vi Editor: vi Editor, Editing with vi, Moving the Cursor, Editing, Copying and Moving Text, Pattern Searching, Repeating the Last Editor Command, Undoing Commands, Joining Lines, Writing Selected Lines onto a Separate File, Using the Shell from vi, Configuring the vi Environment.

(10 Hrs)

UNIT 4:

Regular Expressions : grep Family of Commands and sed : Regular Expressions, grep Family, egrep Command, fgrep Command, Stream Editor-sed.

(5 Hrs)

UNIT 5:

Shell Programming : Shell Variables, export Command, .profile File – A Script Run during Starting, The First Shell Script, read Command, Positional Parameters, The $? Variable – Knowing the Exit Status, More about the set Command, exit Command, Branching Control Structures, Loop-Control Structures, continue and break Statements, expr Command, Real Arithmetic in Shell Programs, The here Document (<<), sleep Command, Debugging Scripts, script Command, eval Command, exec Command.

(15 Hrs)

Text Books:

2. M.G.Venkateshmurthy: Introduction to Unix & Shell Programming, Pearson Education

Reference Books :

5. John Goerzen: Linux Programming Bible, IDG Books, New Delhi.
6. Sumitabha Das: Your Unix - The Ultimate Guide, TMH.
7. Richard Petersen: The Complete Reference – Linux, McGraw-Hill
8. Yashwant Kanetkar: Unix & Shell programming – BPB

BCA-1.6- DSC-3A: FUNDAMENTALS OF MATHEMATICS FOR COMPUTER

Total: 48 Hrs

UNIT 1:

Trigonometric Functions: Introduction, Angles, Trigonometric Functions, Trigonometric Functions of Sum and Difference of two Angles, Trigonometric Equations.

(5 Hrs)

UNIT 2:

Complex Number and Quadratic Equations: Introduction, Complex Number, Algebra of Complex Number, The Modulus and Conjugate a Complex Number, Argand Plane and Polar Representation, Quadratic Equations.

(10 Hrs)

UNIT 3:

Fundamental principles of counting: The rules of sum and product, Permutations, combinations, the binomial theorem, combinations with repetitions.

(9 Hrs)

UNIT 4:

Fundamental of Logic: Basic connectives and truth tables. Logical equivalence, the laws of logic, logical implication, rules of inference, use of quantifiers, quantifiers, definitions and proofs of theorems.

(15 Hrs)

UNIT 5:

Set Theory: sets and subsets, set operations and laws of set theory, counting and venn diagram, Probability.

(9 Hrs)

Text Books :

3. Ralph. P. Grimaldi, Discrete and Combinational Mathematics, An applied introduction, Pearson Education(LPE) Fourth edition, 4th Indian Reprint.
4. Kolman, Busby & Ross, Discrete Mathematical 5/e, Pearson Education .
5. P.G. Umarani & B.G. Umarani: A Text of Mathematics for PUC I & II.

Reference Books:

4. C. L. Liu, Elements of Discrete Mathematics, McGraw Hill, 1985.
5. Richard Johnsonbaugh, Discrete Mathematics, 5th Edition, Pearson Education, 2003.
6. Rajendra Akerkar and Rupali Akerkar, Discrete Mathematics, Pearson Education, 2004
7. B.M. Shrinivasrao: A Text book of Mathematics: Excellent Publication.
8. H.S. Hali & S.R. Knight: Higher Algebra, Surjeet Publications(1988).
9. Shanti Narayan: Differential Calculus. S. Chand & Co.
10. S. L. Loney, Trigonometry, Surjeet Publication.

BCA-1.7- DSC-1A(Pr): C- PROGRAMMING LAB

Programs:

21. Write a C program to find the area of a circle given radius.
22. Write a C program to find the area of a triangle given three sides.
23. Write a C program to calculate simple interest and compound interest.
24. Write a C program to convert temperature in Fahrenheit to Celsius and Celsius to Fahrenheit.
25. Write a C program to find the GCD and LCM of two integer numbers.
26. Write a C program to check whether the given integer is even or odd using if condition statement.

27. Write a C program to accept two integers and determine in which quadrant it lies using if ladder.
28. Write a C program to simulate a simple calculator with addition, subtraction, multiplication, division and it should display the error message for division for 0 using switch case.
29. Write a C program to print number from 100 to 200 which are divisible by 7 and display their sum and count using for loop.
30. Write a C program to reverse a given integer number and check whether the number is palindrome or not using while loop.

31. Write a C program the pattern given below using nested for loop

1.
```
* * * * *
* * * *
* * *
* *
*
```

2.
```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

32. Write a C program to read N integers (zero, positive and negative) into an array and find sum of positive numbers, sum of negative numbers and average of all numbers.

33. Write a C program to find the addition and subtraction of two matrices.
34. Write a C program to calculate the factorial of a number using function.
35. Write a C program to find if a character is alphabetic or numeric or special character.
36. Write a C program to count the number of vowels, consonants and special characters in a given sentence.
37. Write a C program to accept a sentence and convert all lowercase letters to uppercase letters and vice-versa.
38. Write a C program to find the length of a string using user defined function.
39. Write a program to accept different goods with the number, price and date of purchase, finally display them (using structure).
40. Write a C program to implement array using pointers.

Note: All programs should be carried out on UNIX/LINUX platform

BCA-1.8- DSC-2A(Pr): LINUX LAB

Programs:

1. Study Experiment- UNIX basics
2. Basic Shell Programming (Fibonacci Series generation, Factorial of a given number, Checking for Armstrong number)
3. Designing a Arithmetic calculator
4. Generation of Multiplication table
5. Base Conversion (Decimal to Binary, Binary to Decimal) 6. Checking for a Palindrome of a number
6. Finding the information about the Login name and File name
7. Write a shell script to exchange the contents of two variables.
8. Write a shell script, which accepts three subject marks scored by a student and declare the result.
9. Write a shell script program to find area of a square, rectangle, circle and triangle.
10. Write a shell script to print integer numbers from 1 to 20.
11. Write a shell script to perform arithmetic operation on two number depending on +, -, * and /.
12. Write an interactive shell script to display a menu and perform the following task:
    i. Renaming a file ii. Deleting a file iii. Copying a file iv. Exit
13. Write a shell script which counts the number of lines in a file.
14. Write a shell script to accept three command line arguments and display each one of them.

15. Write a c program to a. Display the PID of parent and PID of child. b. Copy the contents of one file into the other using command line arguments.
16. Write a shell script program to check whether the given file is present in a directory and check what is all the permission given for the owner.
17. Write a shell script program to read 2 filename and check which 1 is newer and which is older.
18. Write a shell script program to find the number of directory files and ordinary files in the current directory.

SEMESTER -II

BCA 2.1-AECC-4: ENGLISH-2

(English – Syllabus is decided by respective BoS)

BCA 2.2-AECC-5: MIL-2

(MIL – Syllabus is decided by respective BoS)

BCA 2.3-AECC-6: HUMAN RIGHTS AND ENVIRONMENTAL STUDIES

(HR & ES – Syllabus is decided by respective BoS)

BCA 2.4-DSC-1B: FUNDAMENTALS OF ALGORITHMS

Total: 48 Hrs

UNIT 1:

Introduction to computer problem solving: Introduction, the problem solving aspects, Top-down design, Implementation of Algorithms, program verification, The Efficiency and Analysis of Algorithm.

(6 Hrs)

UNIT 2:

Fundamentals of Algorithms: Exchanging the values of two variables, Counting, Summation of set of Numbers, Factorial Computation, Sine function computation, Generation of Fibonacci Sequence, Reversing the Digits of an Integer, Base conversion,

character to number conversion

(8 Hrs)

UNIT 3:

Factoring Methods: Finding the Square Root of a Number, The Smallest Divisor of an Integer, The Greatest Common Divisor of two Integers, Generating Prime Numbers, Computing the Prime Factors of an Integer, Generation of Pseudo-Random Numbers, Raising a Number to a Large Power, Computing n^{th} Fibonacci number.

(10 Hrs)

UNIT 4:

Array Techniques: Array Order Reversal, Array Counting, Finding the Maximum Number in a Set, Removal of Duplicates from an Ordered Array, Partitioning an Array, Finding the k^{th} Smallest Element.

(12 Hrs)

UNIT 5:

Merging, Sorting, Searching: The two-way Merge, Sorting by Selection, Sorting by Exchange, Sorting by Insertion, Sorting by Partitioning, Linear Search, Binary Search.

(12 Hrs)

Text Books:

1. R.G. Dromey: How to Solve it by Computer, Pearson Education.

Reference Books:

1. N. Writh : Algorithms and Data Structures, Oberon version, 2004.
2. Alan Gibbons: Algorithmic Graph Theory, Cambridge University Press.
3. M.C. Goulmbic: Algorithmic Graph Theory and Perfect Graphs, 2nd edition, Elsevier, 2004

BCA 2.5-DSC-2B: NUMERICAL AND STATISTICAL METHODS

Total: 48 Hrs

NUMERICAL METHODS:

UNIT 1:

Solution of equations (polynomial and transcendental equations), Interval halving methods, secant, Regular Falsi, Newtons-Raphsons methods, fixed point iteration methods,

Solutions of system of linear equations, Gaussian elimination method, Gauss- Jordan, Gauss-Siedal iteration methods LU Decomposition method, Eigen values and Eigen vectors of a Square matrix

(14 Hrs)

UNIT 2:

Newton's forward and backward differences, Interpolation formula- Lagrange interpolation, Curve fitting by least squares method, Numerical Differentiation, Integration, Trapezoidal and Simpson's formula. Romberg integration**.**

(9 Hrs)

STATISTICAL METHODS:

UNIT 3:

Basic Concepts and Definition of Statistics, Mean, standard deviation, Coefficient of variation, Skewness and Kurtosis, Carl Pearson Correlation, rank Correlation and illustrated examples**.**

Probability: Basic concepts and definition of probability axions, Laws of Probability (based on set theory concepts), Conditional probability Boy's theorem, Problems and applications.

(**12 Hrs)**

UNIT 4:

Random variable and Expectation: Discrete and continuous random variables, expectation of random variables, theorems on expectation, illustrative examples, Probability Distribution: Probability function, probability mass / density function, Discrete Distribution- Bernoulli Binomial, Geometric distributions, Continuous distribution- Exponential, normal and Weibul Distribution, applications and problems.

(10 Hrs)

UNIT 5:

Reliability: Basic concepts and definition of reliability, hazard, IFR and DFR, parallel and series system, Application and problems.

(3 Hrs)

References:

1. M. K. Jain, SRK Iyengar and R. K Jain Numerical methods for Scientific and engineering computation: Wiley Eastren(1998).
2. S. S. Shastry: Introductory methods of numerical Analysis PHI(New Delhi) 2001.
3. K. S Trevedi (1998) Probability and statistics with Relability Queing and computer Science application Prentice Hall of India, Pvt Ltd, New Delhi.
4. Vik Kapoor & Gupta: Mathematical statistics S. Chand & Co., New Delhi.
5. S. K. Shina & B. K. Gale: Theory & Relability.

BCA 2.6-DSC-3B: FUNDAMENTALS OF DIGITAL LOGIC

Total: 48 Hrs

UNIT 1:

Number system and codes: Binary number system, decimal number system, octal number system, hexadecimal number system. Bases inter conversions. Representation of negative numbers 1's and 2's complements. Codes: BCD, GRAY, EXCESS-3.

(4 Hrs)

UNIT 2:

Boolean algebra and logic systems: Laws of Boolean algebra, Boolean laws. Evaluation of Boolean expression, De Morgan's theorems and proof, simplification on Boolean expressions using Boolean laws Basic gates (AND, OR, NOT): truth table, Definition, Boolean expression and symbols, universal gates (NAND, NOR): truth table, definition, Boolean expression and symbols, design of basic gates using NAND and NOR gates. Logical gates using NAND and NOR, Design of given Boolean expression using basic gates or NAND gate or NOR gate. XOR and XNOR gate (Definition, Boolean expression and symbols, truth table).

(10 Hrs)

UNIT 3:

Simplification of Boolean functions: SOP and POS form, min term and max term, expression of Boolean equation in Min and Max term (conversion of SOP and POS forms to standard form) K-map method: Rules, simplification of Boolean equation using K-map (up to 4 variables), without and with don't-care condition, Implementation using basic gates or NAND gate or NOR gate, Quine - Mc Cluskey Tabulation method, determination and selection of prime implicates.

(12 Hrs)

UNIT 4:

Combination logic: Design procedure, design of half adder and full adder, half subtract or and full sub tractor. Code converters:- BCD to Excess 3 code, gray code, magnitude comparator, encoders (BCD to decimal), decoder (decimal to BCD), multiplexer(4:1 and 8:1), de-multiplexer(1:4 and 1:8).

(08 Hrs)

UNIT 5:

Sequential logic: Introduction, Flip-flops – SR, JK, D, T, JK-MS (Detailed Study) Registers – Introduction, shift register- types and applications. Counters – synchronous and asynchronous counters (Up, down, up down).

(14 Hrs)

Text Book:

2. M. Moris Mano, Computer System Architecture, 2nd Edition, Prentice Hall of India.

Reference:

1. Heuring and Jordan, Computer systems design and architecture, Pearson Education
2. William Stallings, Computer Organization and Architecture, Pearson Education 2003.
3. Andrew S Tenenbaum, Structured Computer Organization, 3rd Edition, Prentice Hall of India(1990).

BCA 2.7-DSC-1B(Pr): ALGORITHMS LAB

Programs:

1. Write a function that accepts N integers to find maximum and minimum element in an 1 to N integers.
2. Write a C program to find N Fibonacci Series.
3. Program to read N (minimum 5) students marks and find number of students passed and fail depending on the marks.
4. Write a C program to find the roots of the given quadratic equation using nested if statement.
5. Write a C Program to compute $x^n/_{n!}$
6. Program to convert binary number to decimal.
7. Program to find Geometric Mean G.M=$\sqrt[n]{(x1Xx2Xx3Xx4 \dots . xn)}$
8. Program to iteratively compute the reciprocal of a number.
9. Check whether given number is Armstrong or not

10. Generate N prime numbers.
11. Partition given array into two sub array and print each sub array elements.
12. Program to remove duplicates from an ordered array.
13. Program to merge two separate array into single array.
14. Sort the array elements by using Exchange. Selection and Insertion
15. Binary search using recursive as well as iterative techniques.
16. Write a C program to reverse the digits of an integer and characters of the string.
17. Write a C program to display all possible permutations of given input string – if the string contains duplicate characters, you may have multiple repeated results. Input should be of the form permute string and output should be a word per line. sample: cat: cat, cta, act, atc, tac, tca
18. Write a C program design and implement scientific calculator using math and string functions.

Note: All programs should be carried out on UNIX/LINUX platform

BCA 2.8 -DSC-2B(Pr): NUMERICAL AND STATISTICAL METHODS LAB

Programs:

Numerical Methods Programs

15. Program to check whether the given matrix is singular or not.
16. Program to find the root of the equation using Bisection Method.
17. Program to find roots of an eqn f(x) =0 using Regular-Falsi Method.
18. Program to find the root of the equation using Newton Raphson Method.
19. Program to solve the system of equation Ax = B using Gauss Elimination Method.
20. Program to solve the system eqn Ax = B using Gauss Jacobin Method.
21. Program to solve the system eqn Ax = B using Gauss Seidel Method.
22. Program to find integral of a function using Trapezoidal rule.
23. Program to find integral of a function using Simpson's $1/3^{rd}$ rule.

24. Program to find integral of a function using Simpson's $3/8^{th}$ rule.

Statistical Methods Programs

16. Program to construct a discrete frequency distribution table and find the mean and standard deviation.
17. Program to construct a continuous frequency distribution table and find the mean and standard deviation.
18. Program to find the mean, mode and median of continues frequency distribution.
19. Program to find the Karl Pearson correlation coefficient between two variables.
20. Program to find AM, GM, HM for given set of observation.
21. Program to calculate GM for tabulated data.
22. Program to calculate combined AM and find HM for continuous set of data
23. Program to calculate combined SD.
24. Program to calculate median for raw set of data.
25. Program to find median for tabulated data.

Note: All programs should be carried out on UNIX/LINUX platform

SEMESTER -III

BCA 3.1-AECC-7: ENGLISH-3

(English – Syllabus is decided by respective BoS)

BCA 3.2-AECC-7: MIL-3

(MIL – Syllabus is decided by respective BoS)

BCA 3.3-DSC-1C: DATA STRUCTURES USING 'C'

Total: 48 Hrs

UNIT 1:

Introduction to Data structures: Review of Structures and Pointers, Definition, Classification of Data structures: Primitive and Non-Primitive, Operations on Data

structures, **Recursion:** Definition, Recursion in C, writing Recursive programs-Fibonacci, GCD, Factorial. **(8 Hrs)**

UNIT 2:

Stack: Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from infix to postfix, Applications of stacks.

Queue: Definition, Array representation of queue, Types of Queue: Simple Queue, Circular Queue, Double Ended Queue (dequeue), Priority Queue, Operations on all types of Queues

(10 Hrs)

UNIT 3:

Linked list-Definition: Components of linked list, representation of linked list, Advantages and disadvantages linked list. Types of linked list: singly and doubly, circular and circular doubly linked list. Operations on singly linked list: creation, insertion, deletion, search and display. **(9 Hrs)**

UNIT 4:

Non Linear Data Structure-Definition: Tree, Binary tree, Complete Binary tree, Binary search tree, Heap. Tree terminologies. Binary tree: Memory representation, Creation of binary tree. Traversal of Binary tree.

(9 Hrs)

UNIT 5:

Searching and Sorting: Searching algorithm techniques: Sequential search, Binary search-Iterative and Recursive methods, Comparison between Sequential and binary Search**. Sorting:** General Background**:** Definition, Various types of sorting: Bubble sort, Merge sort, Quick sort.

(12 Hrs)

Text Books:

3. Kamthane: Introduction to Data Structure in C. Pearson Education 2005.
4. Langsam, AusensteinMaoshe& M. Tanenbaum Aaron, Data Structure using C and C++ Pearson Education.

References Books:

3. Weiss: Data Structure and Algorithm Analysis in C, IInd Edition, Pearson Education.
2. Lipschutz: Schaum's outline series Data Structures, Tata McGraw Hill.
3. Tenenbaum: Data Structures using C, Pearson Education.

BCA 3.4-DSC-2C: OOP with C++

Total 48 Hrs

UNIT 1:

Introduction: Procedural languages, definition of OOP, Basic concept of OOP, Object, Class, Data Abstraction, Encapsulation, Data Hiding, member functions, Reusability, Inheritance, Creating new data Type, Polymorphism, Overloading, Dynamic binding, Message Passing**.**

C++ Features: The iostream class, C++ comments, C++ keywords, variable declaration, the const qualifier, the endl, setw, set Precision, Manipulators, The scope resolution operator, the new and delete operators**.**

Functions: Simple functions: function declaration, calling the function, function definition, passing argument to, returning value from function, passing constants, variables, pass by value, passing structure variables, pass by reference, default arguments, return statements, return by reference, overloaded functions, different number of arguments, different kinds of arguments, inline functions. **(10 Hrs)**

UNIT 2:

Objects & Classes: classes & objects, class declaration, class members, data constructors, destructors, member functions, class member visibility: private, public, protected. The scope of the class object constructors, default constructor, constructor with argument, constructor with default arguments, dynamic constructors, copy constructor, overloaded constructor, object as function arguments, member functions defined outside the class, objects as arguments, returning objects from functions, class conversion, manipulating private data members, destructors, classes, objects &memory, array as class member data, Array of objects, string as class member.

(10 Hrs)

UNIT 3:

Operator Overloading: Overloading unary operator, operator keyword, operator arguments, operator return value, nameless temporary objects, limitations of increment operator, overloading binary operator, arithmetic operator, comparison operators, arithmetic assignment operator, Data conversion: conversion between basic to class types, conversion between objects and basic types, conversion between objects of different classes**.**

(8 Hrs)

UNIT 4:

Inheritance: Derived class & Base class: Specifying the derived class accessing the base class members, the protected access specifier, derived class constructor, overriding member functions, public & private inheritance, access combinations, classes & structures, access specifies, level of inheritance: Multilevel inheritance, hybrid inheritance, multiple

inheritance, member functions in multiple inheritance, constructors in multiple inheritance, Containership: classes within classes, Inheritance & program development**.**

(10 Hrs)

UNIT 5:

Virtual Functions: Normal member function accessed with pointers, virtual member function accessed with pointers, dynamic binding, pure virtual functions, Friend function: friends for functional notation, friend classes, this pointer, accessing member data with this, using this for returning values**.**

Templates & Exception Handling: Introduction, templates, class templates, function templates, member function templates, template arguments, Exception handling.

(10 Hrs)

Text Book:

3. E.Balaguruswamy: Object oriented Programming with C++ Tata McGraw Hill publications.
4. Lafore Robert: Object oriented Programming in Turbo C++ Galgotia Publications.

Reference:

4. Stanley B. Lippman, Josee Lajoie, Barbara E. Moo : C++ primer, 5th Edition, Addison-Wesley.
5. Prata : C++ primer Plus, 4th Edition, Person Education.
6. Strousstrup: The C++ programming Language Pearson Education .

BCA 3.5-DSC-3C: INTRODUCTION TO OPERATING SYSTEM

Total: 48 Hrs

UNIT 1:

Introduction: Batch systems, Concepts of Multiprogramming and Time sharing, Parallel, Distributed and real time Systems, Operating System Structures, Components &services, System calls, System programs, Virtual machines. **Process management**: Process concept, Process scheduling, Co-operating process, Threads, Inter-process communication. **CPU Scheduling:** CPU scheduling criteria, Scheduling algorithm, Multiple-Processor Scheduling, Real time scheduling.

(12 Hrs)

UNIT 2:

Process Synchronization: The Critical section problem, Semaphores, Classical problems of synchronization. **Deadlocks:** System Model, Characterization, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery from deadlock.

(10 Hrs)

UNIT 3:

Memory Management: Logical and physical address space, Swapping, Contiguous memory allocation, Paging, Segmentation, Segmentation with paging. **Virtual Memory Management:** Demand paging, Page replacement algorithms. **File management**: File concepts, Access methods, Directory structure, File system structures, Allocation methods. **Disk management:** Disk structure & scheduling methods, Disk management, Swap space management, Disk reliability .

(16 Hrs)

UNIT 4:

The Linux System Case Study: History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File System, Input and Output, Interprocess Communication, Network Structure, Security.

(5 Hrs)

UNIT 5:

Windows and MAC OS X: History, Design Principles, System Components, Environmental Subsystems, File System, Networking, Programmer Interface.

(5 Hrs)

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Operating System concept, 5th edition, Addision-Wesley.

Reference Books:

1. Operating systems concepts and design –Milloan Milonkovic, II edition, McGraw- Hill, 1992
2. Operating systems - Harvey D Deital 2nd edition, Addision Wesley 1990.
3. Linux- The complete reference –Richard Peterson
4. Operating system concepts –Tanenbaum.
5. Stallings, Operating systems, Pearson Education, Asia

BCA 3.6-DSC-4C: DATA COMMUNICATIONS

Total: 48 Hrs

UNIT 1:

Introduction: Data Communication: Components, Representation, Data flow. Networks: Network Criteria, Network Topology, Physical structure, Network Classification, The Internet, Protocols and Standards, Switching: Message, Packet and Circuit switching.

Network Models: Layered architecture, The OSI model, TCP/IP Protocol suite, ARPANET.

(8 Hrs)

UNIT 2:

Digital transmission and physical layer: Digital Representation of Information**,** Analog and Digital signals, Data rate limits, Digital to Analog conversion, Analog to digital conversion. **Digital transmission:** Line coding, Modulation, Transmission modes, Multiplexing: Frequency Division Multiplexing (FDM), Time Division Multiplexing(TDM), Wavelength Division Multiplexing(WDM). SONET**,** ISDN

Transmission Media: Guided media: Twisted Pair, Co-axial Cable, Optical fiber. Un-guided media. Cellular Telephones Generation of networks: 1G,2G,3G,4G.

(12 Hrs)

UNIT 3:

Datalink Layer: Datalink Layer Design Issues**,** ARQ Protocols: Stop and Wait, GO – Back - N, Selective Repeat Protocols. Efficiency of ARQ Protocols. Flow control, Sliding window flow control. Data link control: HDLC, PPP. Statistical Multiplexing. Error detection, Parity bit, Two-dimensional parity checks, Internal checksum, Polynomial codes.

(10 Hrs)

UNIT 4:

Medium access Control Protocols: Multiple access communication. Local Area Network-LAN Structure, MAC Sublayer, Logical link control layer. Random Access Protocol-ALOHA, Slotted ALOHA, CSMA, CSMA/CD. Scheduling Approaches to medium access control- Reservation Systems, Polling, Token Passing ring. Channelization-FDMA, TDMA, CDMA.

(10 Hrs)

UNIT 5:

LAN Standards: Ethernet and IEEE 802.3 LAN Standard, Token Ring and IEEE 802.5 LAN Standard, FDDI, Wireless LAN's and IEEE 802.11 LAN Standard.

Connecting LAN's: Connecting Devices- Hubs, Repeaters, Bridges: Transparent Bridges,

Source Routing Bridge, Mixed-media Bridge. Routers, Gateways. Backbone Networks. Virtual LAN's**.** **(8 Hrs)**

Text Books:

4. Alberto Leon-Garcia & Indra Widjaja, Communication Networks- Fundamental Concepts & Key Architecture, Mc.Graw Hill.
5. Behrouz Ferouzan, introduction to Data Communications & Networking TMH.
6. Stalling, Data and Computer Communications, 7/e, Pearson Education.

Reference Books:

3. Andrew S Tanenbaum, Computer Networks, 4/e, Pearson Education.
4. S. Keshav, An Engineering Approach to Computer Networks. Pearson Education.

BCA 3.7-DSC-1C(Pr): DATA STRUCTURES USING 'C' LAB

Programs:

21. Write a C program to read and Calculate item prices used in party and divide the expenses amount in friends equally in C using Structures.
22. Write a C program to calculate the length of the string using pointer.
23. Write a C program to simulate the working of Tower of Hanoi problem for N disks, print the total number of moves taken by the program.
24. Write a C program to create a file for N number of Employees; it should contain Emp. No., Name of the Employee, Basic Salary, DA, Total Salary.
25. Write a C program to demonstrate the working of stack of size N using an array. The operations to be supported are 1. PUSH 2. POP 3. DISPLAY.
26. Write a C program to convert an Infix Notation to Postfix Notation.
27. Write a C program to convert and Infix Notation to Prefix Notation.
28. Write a C program to simulate the working of an ordinary Queue using an array. Provide operations QINSERT, QDELETE and QDISPLAY.
29. Write a C program to implement Double Ended Queue using Array data structure.
30. Write a C program to implement Circular Queue
31. Write a C program to implement Priority Queue
32. Write a C Program to implement Single Linked List.
33. Write a C program to implement Double Linked List.
34. Write a C program to implement Sequential Search Technique using static array & pointers.
35. Write a C program to implement Binary Search Technique using dynamic array.
36. Write a C program to sort a given list by bubble sort.
37. Write a C Program to sort a list of N elements using Merge sort technique.
38. Write a C Program to sort a list of N elements using Quick sort technique.
39. Write a C Program to Create Binary Tree.
40. Write a C Program to Tree Traversal: In-order, Pre-order, Post-order.

Note: All programs should be carried out on UNIX/LINUX platform

BCA-3.8-DSC-2C(Pr): OOP LAB

Programs:

21. Demonstrate digital clock
22. Calculate area and circumference of a circle using inline function
23. Demonstrate default arguments function.
24. Demonstrate object as function arguments and returning objects from function.
25. Input roll number, name, marks of three subjects and display total and average demonstrating array as object.
26. Swap two numbers using friend function.
27. Demonstrate single inheritance.
28. Demonstrate multiple inheritances.
29. Perform addition of 2 matrices using operator overloading.
30. Demonstrate multiplication of two matrices using operator overloading.
31. Demonstrate to overload Arithmetic Assignment "+=" and "-=" operators
32. Implement operations on stack.
33. Demonstrate derived class constructor and overriding member functions in base and derived class.
34. Sort elements using function template.
35. Demonstrate class template.
36. Demonstrate default constructor and parameterized constructor.
37. Demonstrate copy constructor.
38. Find area and circumference of rectangle and triangle using function overloading.
39. Compare two strings using equal operator.
40. Demonstrate virtual function.

Note: All programs should be carried out on UNIX/LINUX platform

SEMESTER -IV

BCA 4.1-AECC-9: ENGLISH-4

(English – Syllabus is decided by respective BoS)

BCA 4.2-AECC-10: MIL-4

(MIL – Syllabus is decided by respective BoS)

BCA 4.3-DSC-1D: DATA BASE MANAGEMENT SYSTEM

Total: 48 Hrs

UNIT 1:

Introduction: Database and Database Users, Characteristics of the Database Approach, Different People behind DBMS, Implication of Database Approach, Advantages of Using DBMS, When not to use a DBMS.

Database System concepts and Architecture: Data Models, Schemas and Instances, DBMS Architecture and Data Independence, Data Base Languages and interfaces, The Database System environment, Classifications of Database Management Systems.

(10 Hrs)

UNIT 2:

Data Modeling Using The Entity Relation Model: High Level Conceptual Data Models for Database Design With an Example, Entity Types Entity sets, Attributes, and Keys, ER-Model Concepts, Notations fro ER Diagrams, Proper Naming of Constructs, Relationships Types of Degree than two. Designing example ER diagrams for requirements

(8 Hrs)

UNIT 3:

Relational Data Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schema, Defining Relations, Update Operations on Relations and constraint violations, Basic Relational Algebra Operations, Additional Relational Operations. Queries in relational algebra using all the operations

(12 Hrs)

UNIT 4:

Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relational Schemas, Functional Dependencies, Normal Forms Based on primary Keys, General Definitions of Second And Third Normal Forms, Boyce-Codd Normal Form.

(6 Hrs)

UNIT 5:

Relational Database Language: Data definition in SQL-Queries in SQL, INSERT, DELETE, UPDATE Statements SQL, **Data Types in SQL:** Number Types, Character Type, NSL Character Types. **Components of SQL:** Data Definition Language (DDL), Data Manipulation Language (DML), Query Language (QL), Data Control Language (DCL), **Set Operations:** Union, Intersection, Minus, Renaming of Tables. **SQL Operations:** Logical Operators (NOT IN, ALL, ANY, EXIST, NOT EXIST, LIKE, NOT LIKE, IS NULL, IS NOT NULL, AND, OR, NOT) **SQL Functions:** Number Functions, Character Functions, Date Functions, Aggregate Functions. **Integrity Constraints:** Advantages of Integrity Constraints, Primary Key, Unique Key, Super Key, Candidate Key, Composite Key, Foreign Key, Domain Constraint, Key Constraints VIEWS in SQL, Specifying general Constraints and assertions.

(12 Hrs)

Text Books:

1. Elmasri & Navathe, Fundamentals of Database System (4ed), Pearson Education, 2003.
2. Sundarraman, Oracle 9i Programming a Primer,(1ed), Pearson Education.

Reference Books:

2. Kahate, Introductions to Database Management Systems, Pearson Education, 2004.
2. Abrahamsi silberschatag, Henry. F.Korth, S. Sudarshan, Database Systems Concepts, McGraw Hill.
3. Jefry. D. Ullaman, Principles of Database System. Oracle Press: ORACLE-Complete Reference.
4. C.J.Date, Introductins to Database Systems, (6ed) Addison Wesley, 1995.
5. Raghu Ram Krishnan, Database Management Systems, Second Edition, Mc.Graw Hill.2000.

BCA 4.4-DSC-2D: PROGRAMMING IN JAVA

Total: 48 Hrs

UNIT 1:

Introduction to JAVA: JAVA Evolution: Java History, Java Features, How Java differs from C and C++, Java and Internet, Java and World Wide Web, Web browsers, Hardware and software requirements, Java Support Systems, Java Environment. **Overview of JAVA Language:** Introduction, Simple Java Program, More of Java, An Application with Two Classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. **Constants, Variables, and Data Types:** Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values.

Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Procedure of Arithmetic Operators, Type Conversion and Associativity, Mathematical functions. **Decision Making and Branching:** Introduction, Decision Making with if statement, simple if statement, if...else statement, Nesting of if....else statements, the else if Ladder, the switch statement, the **?:** Operator. **Decision Making and Looping:** The while statement, The do statement, The for statement, Jumps in Loops, Labelled Loops.

(10 Hrs)

UNIT 2:

Classes, Arrays, Strings and Vectors: Classes, Objects and Methods: Introduction, Defining a class, Adding Variables, Adding Methods, Creating Objects, Accessing class members, Constructors, Methods Overloading, Static Members, Nesting of Methods. **Inheritance:** Extending a class, Overriding Methods, Final Variables and Methods, Finalizer Methods, Abstract Methods and Classes, Visibility Control. **Arrays, Strings and Vectors:** Arrays, One-dimensional Arrays, Creating an array, Two-dimensional Arrays, Strings, Vectors and Wrapper Classes.

(8 Hrs)

UNIT 3:

Interfaces, Packages, and Multithreaded Programming: Interfaces: Multiple Inheritances: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. **Packages:** Putting Classes together: Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes. **Multithreaded Programming:** Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a thread, Life Cycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the Runnable Interface.

(10 Hrs)

UNIT 4:

Managing Exceptions, Applet Programming: Managing Errors and Exception: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging. **Applet Programming:** Introduction, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, More about Applet Tag, Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numerical Values, Getting

Input from the user.

(12 Hrs)

UNIT 5:

Graphics Programming, Input/Output: Graphics Programming: Introduction, The Graphics class, Lines and rectangles, circles and ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts.

(8 Hrs)

Text Books:

3. Shishir Gundavaram, CGI Programming on the World Wide Web, O'Reilly and Associates, (1996). (Chapter 1-7)
4. E. Balaguruswamy, Programming with JAVA, A Primer, 2nd Edition. TMH(1999),(Chapter 2-16)

Reference Books:

6. Thomas Boutel, CGI Programming in C and Perl, Addison—Wesley, (1996).
7. Jefry Dwight et al, Using CGI, (Second Edition), Prentice Hall, India, (1997).
8. Darrel Ince & Adam Freeman, Programming the Internet with Java, Addison—Wesley,(1997).
9. Ken Arnold & James Gosling, The Java Programming Language, Addison—Wesley,(1998).
10. Patrick Naughton & Herbert Schildt, JAVA 2: The Complete Reference, 3rd Edition, TMH, (1999).

BCA 4.5-DSC-3D: SOFTWARE ENGINEERING

Total: 48 Hrs

UNIT 1:

Introduction: The Evolving role of Software, Software: Software Characteristics, Software Components, Software Applications. **The Process**: Layered Technology. Process, Methods, Tools. The Software Process, Software Process Model: Linear Sequential Model, Prototyping Model, RAD Model, Incremental Model, Spiral Model.

(8 Hrs)

UNIT 2:

Analysis Concepts and Principles: Requirements Analysis, Communication Techniques, Analysis Principles, Software Prototyping, Specification principles, Software requirements

Specification. Analysis Modeling: Brief History, Elements of the Analysis Model, Data Modeling, Function Modeling and Information Flow, Behavioral Modeling, Data Dictionary.

(11 Hrs)

UNIT 3:

Design Concepts and Principles: Software Design and Software Engineering, Design Process, Design Principles, Design Concepts, Effective Modular Design: Cohesion, Coupling. Design Documentation. Software Quality Assurance: Quality Concepts, Software Quality Assurance, Software Reviews, Software Reliability.

(11 Hrs)

UNIT 4:

Software Testing Techniques and Strategies: Software Testing Fundamentals: Testing Objectives, Testing Principles, Testability, Test Case Design, white Box Testing, Basis Path Testing, Control Structure Testing, Black Box Testing. Strategic Approach to Software Testing, unit Testing, Integration Testing, Validation Testing, System Testing.

(10 Hrs)

UNIT 5:

Object Oriented Concepts and Principles: The Object Oriented Paradigm, Object Oriented Concepts, Object Oriented Analysis Introduction, Object Oriented Design: Design for Object-Oriented System, The OOD Landscape, Generic Components, The Object Oriented Process.

(8 Hrs)

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Text Book:

2. Roger Pressman, Software Engineering- a Practitioner's Approach.

Reference Books:

1. Ian Sommerville, Software Engineering, 6th Edition, Pearson, Publication Ltd.
2. Carlo Ghejgietal, Fundamentals of Software Engineering Pearson Education.

BCA 4.6-DSC-4D: SYSTEM PROGRAMMING

Total: 48 Hrs

UNIT 1:

Background: Machine Structure, Evolution of the Components of a Programming System, Assembler, Loaders, Macros, Compilers, Formal Systems. **Machine Structure:** General Machine Structure, Instruction format, Representation of 360/370 instructions, Machine Language and Assembly Language.

(12 Hrs)

UNIT 2:

Assemblers: General design procedure, design of Assembler, statement of problem, data Structure, Format of Date bases, Algorithm for pass 1 and pass 2, look for modularity. Explanation along with flowcharts for both pass 1 and pass 2 (detail flowchart). **Table Processing**: Searching & Sorting - Linear and binary search, comparison, examples. Interchange sort, shell sort, bucket sort, radix exchange sort, address calculation sort, Random entry searching.

(9 Hrs)

UNIT 3:

Macro Language and The Macro Processor: Introduction, Macro instructions, Features of macro facility-macro instruction arguments, Conditional macro Expansion, Macro calls within macro, Macro instruction defining macro implementation: statement of problem, Specification of databases and specification of database format, Algorithm and flowchart for processing macro definitions and macro expansion.

(9 Hrs)

UNIT 4:

Loaders: Introduction, Loader schemes-compile and go loader scheme, general loader, Absolute loader, Sub routine linkage, Relocating loader, Direct linking loader, overlays, Dynamic loading.

(9 Hrs)

UNIT 5:

Compilers: Introduction, Statement of problem, Phases of compiler, Lexical phase, syntax phase, interpretation phase optimization phase, storage assignment phase, code generation phase, Assembly phase, passes of compiler. Data Structures: statement of problem, storage classes and its use.

(9 Hrs)

Text Books:

4. John J. Donowon, System Programming, TATA McGraw Hill.
5. Beck: System Software, 3/e Pearson Education.
6. System Software – Leland L. Beck, Third edition, Addison Wesley 1997

Reference Books:

2. Dhamdhere: System Programming and Operating System TMH Laudon & Laudon, Management Information Systems, 8/e Pearson Education

BCA 4.7-DSC-1D(Pr): DATA BASE MANAGEMENT SYSTEM LAB

Programs:

4. A) Create the following relation for the student :

Student (regno : string , name : string, class :string, bdate: date, marks1:int, marks1:int, marks2:int, marks3:int)

v. Enter atleast five tuples of the above relation
vi. Demonstrate the usage of following clauses for the above relation
   a. Where c. Having
   b. Order By d. Group By
vii. Demonstrate the usage of following clauses for the above relation
   a. Sum c. Count e. Between
   b. Avg d. Like f. Max & Min
viii. Demonstrate the rollback and commit command for the above relation

C) Consider the following database that maintain information about employees & Departments.

Employee(empid: int, ename:string, age:int, salary:int, #deptno:int)
Department(deptno:int, dname: string, #manager-id: int)

vi. Create the above tables by properly specifying the primary keys & foreign keys.
vii. Enter at least 5 tuples for each relation.
viii. Display emp-id & emp name whose salary lies between 10,000 and 50,000.
ix. List empname & salary for all the employee working for CS Dept.
x. Display empname & deptname for all the managers.

5. Consider the following schema for Order Database:
   SALESMAN (Salesman_id, Name, City, Commission)

   CUSTOMER (Customer_id, Cust_Name, City, Grade,Salesman_id)

   ORDERS (Ord_No, Purchase_Amt, Ord_Date, #Customer_id, Salesman_id)

   Write SQL queries to

   vi. Count the customers with grades above Bangalore's average.
   vii. Find the name and numbers of all salesmen who had more than one customer.
   viii. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)
   ix. Create a view that finds the salesman who has the customer with the highest order of a day.
   x. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

6. Consider the Insurances database given below. The primary keys are underlined and the data types are specified.

   PERSON (DRIVER-ID#: string, name: string, address: string)
   CAR (Regno: string, model: string, year: int)
   ACCIDENT (report-number: int, date: date, location: string)
   OWNS (#driver-id: string, #Regno: string)
   PARTICIPATED (#driver-id: string, #Regno: string, #report-number: int, Damage amount: int)

   vi. Create the above tables by property specifying the primary keys and the foreign keys.
   vii. Enter atleast five tables for each relation.
   viii. Demonstrate how you
      a. Update the damage amount for the car with a specific Regno in the accident with report number 12 to 25000.
      b. Add a new accident to the database.
   ix. Find the total number of people who owned cars that were involved in accidents in 2002.
   x. Find the total number of accidents in which cars belonging to a specific model were involved

4. The following tables are maintained by a book dealer.

   AUTHOR (author-id: int, name: string, city: string, country: string)
   PUBLISHER (publisher-id: int, name: string, city: string, country: string)
   CATALOG (book-id: int, title: string, author-id#: int, publisher-id#: int, category-id#: int, year: int, price: int)
   CATEGORY (category-id: int, description: string)
   ORDER-DETAILS (order-no: int, #book-id: int, quantity: int)

vi. Create the above tables by properly specifying the primary keys and the foreign keys.
vii. Enter at least five tuples for each relation.
viii. Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog.
ix. Find the author of the book, which has maximum sales.
x. Demonstrate how you increase the price of books published by a specific publisher by 10%.

5. Consider the following database of student enrolment in courses and books adopted each course.

STUDENT (regno: string, name: string, major: string, bdate: date)
COURSE (course: int, cname: string, dept: string)
ENROLL (#regno: string, course#: int, sem: int marks: int)
TEXT (book-ISBN: int, book-title: string, publisher: string, author: string)
BOOK_ADOPTION (course#: int, sem: int, book-ISBN#: int)

r. Create the above tables by properly specifying the primary keys and the foreign Keys.
vi. Enter at least five tuples for each relation.
vii. Demonstrate how you add a textbook to the database and make this book be adapted by some department.
viii. Produce list of textbooks (include Course#, Book-ISBN, Book-title) in the alphabetical order for courses offered by the CS department that use more than two books.
ix. List any department that has its adopted books published by a specific publisher.

6. Consider the following database for library management system

BOOK (Book_id, Title, Publisher_Name, Pub_Year)
BOOK_AUTHORS (#Book_id, Author_Name)
PUBLISHER (Name, Address, Phone)
BOOK_COPIES (#Book_id, #Branch_id, No-of_Copies)
BOOK_LENDING (#Book_id, #Branch_id, Card_No, Date_Out, Due_Date)
LIBRARY_BRANCH (Branch_id, Branch_Name, Address)
Write SQL queries to

v. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.
vi. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun2017
vii. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
viii. Create a view of all books and its number of copies that are currently available in the Library.

7. Consider the schema for Company Database:

EMPLOYEE (SSN, Name, Address, Sex, Salary, #SuperSSN, DNo)
DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)
DLOCATION (#DNo,DLoc)
PROJECT (PNo, PName, PLocation, #DNo) WORKS_ON (#SSN,# PNo, Hours)

Write SQL queries to

v. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
vi. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percentraise.
vii. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
viii. Create a view with columns dept name and dept location. Display name of dept located in 'Dharwad' on this view.

Note : 1. All the experiments are to be carried out using MySql.

2. Draw ER diagram and Schema diagram for each lab program.

BCA 4.8-DSC-2D(Pr): JAVA LAB

Programs:

21. Display fibonacci series up to n terms using command line arguments.
22. Demonstrate single inheritance.
23. Sort n elements using an array.
24. Implement constructor overloading by passing different number of parameter of different types.
25. Demonstrate string methods.
26. Demonstrate vector methods.
27. Demonstrate concept of interface.
28. Demonstrate concept of creating, accessing and using a package.
29. Demonstrate multithreaded programming.
30. Demonstrate thread priority.
31. Create an applet to draw a human face.
32. Demonstrate simple banner applet.

33. Program to count number of strings, integers and float values through command line arguments.
34. Program to accept a message from the keyboard and display the no. of words and non alphabetical characters.
35. Demonstrate creation of list using an applet.
36. Demonstrate concept of event handling.
37. Program to demonstrate different types of fonts.
38. Create an applet to tokenize the string.
39. Design a simple calculator using java applets.
40. Implement static and dynamic stack using interface using abstract class.

SEMESTER - V

BCA 5.1-DSC-1E: WEB TECHNOLOGIES

Total: 48 Hours

UNIT 1:

Introduction HTML, XHTML and CSS: Introduction to HTML, What is HTML and Where did it come from?, HTML Syntax, Semantic Markup, Structure of HTML Documents, Quick Tour of HTML Elements, HTML5 Semantic Structure Elements, **XHTML:** Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms, Frames, syntactic differences between HTML and XHTML. **Cascading Style Sheets (CSS) :** Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.

(12 Hrs)

UNIT 2:

The basics of JavaScript: Overview of JavaScript, Object orientation and JavaScript, general Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts,

(10 Hrs)

UNIT 3:

JavaScript and XHTML Documents: The JavaScript Execution Environment, The Document Object Model, Elements Access in Java Script, Events and Event Handling, Handling Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Model, The navigator Object, Dom Tree Traversal and Modification.

(8 Hrs)

UNIT 4:

Dynamic Documents with JavaScript: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements.

(9 Hrs)

UNIT 5:

Introduction to XML: Introduction, Syntax of XML, XML Document Structure, Document type definitions, Namespaces, XML schemas, displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.

(9 Hrs)

Text Books:

1. Robert W. Sebesta, Programming the World Wide Web, 4th Edition, Pearson education, 2012.
2. Randy Connolly, Ricardo Hoar, Fundamentals of Web Development, 1st Edition, Pearson Education India.

Reference Books:

1. Jeffrey C. Jackson, Web Technologies-A Computer Science Perspective, Pearson Education, 7th Impression, 2012.
2. Chris Bates, Web Technology Theory and Practice, Pearson Education, 2012.
3. Raj Kamal, Internet and Web Technologies, McGraw Hill Education.

BCA 5.6-DSC-1E(Pr): WEB DESIGNING LAB

Programs:

21. A. Create a webpage that prints your name on the screen. (HTML)

B. Create a webpage and set its title to "This is a webpage". (HTML)

22. Print the numbers 1 - 10, each number being a different color. (HTML)
23. Print a paragraph that is a description of a book, include the title of the book as well as its author. Names and titles should be underlined, adjectives should be italicized and bolded. (HTML)
24. Print the squares of the numbers 1 - 20. Each number should be on a separate line, next to it the number 2 superscripted, an equal sign and the result. (Example: 10^2= 100) (HTML)
25. Create links to five different pages on five different websites that should all open in a new window. (HTML)
26. Create an XHTML page that provides information about your department. Your XHTML page must use the following tags:
    A. Text Formatting tags B. Horizontal rule
    C. Meta element D. Links E. Images F. Tables
27. A. Setting a background image for a page Using CSS
    B. Setting text color and background color Using CSS
28. Setting the font type of text Setting the font size of text Setting the font color of text Setting the font style of text Using CSS
29. Create a webpage with two images which alternately changes on mouse over using CSS.
30. Create a webpage to demonstrate the use of external Cascading Style Sheets
31. Develop and demonstrate the usage of inline, external and internal style sheet using CSS. Use XHTML page that contains at least three paragraphs of text, listed elements and a table with four rows and four columns.
32. Write a JavaScript program to display the current day and time in the following format. Go to the editor
    Sample Output : Today is : Tuesday.
    Current time is : 10 PM : 30 : 38
33. Write a JavaScript program to convert temperatures to and from Celsius, Fahrenheit.
34. Write a JavaScript program to find the largest of three given integers.
35. Create a webpage to convert a given text from uppercase to lowercase using JavaScript.
36. Write a JavaScript program to generate n number of random numbers and store them in an array. Sort the generated numbers in ascending order using array sort method and display the results with appropriate messages.
37. Create a webpage with two textboxes and command buttons to perform arithmetic operations and display the result in appropriate dialog boxes using JavaScript.
38. Write a Java Script program to read the details of a student and store the same on to the MS Access database.
39. Write a JavaScript application to evaluate the salary details of an employee and store the same in the MS Access database table.
40. Design an XML document to store information about a student in a college affiliated to KUD. The information must include Reg. no., Name, and Name of the College,

Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

BCA 5.2A-DSE-1E: Elective-I: MANAGEMENT INFORMATION SYSTEM

Total: 48 Hours

UNIT 1:

Management Information Systems: Management Information System: Concept, **MIS:** Definition, Role of the Management Information System, impact of the Management Information System, Management Information, System and computer, Management Information System and academics, MIS and the user**.**

Role and Importance of Management: Introduction to Management, Approaches to Management, Functions of the Manager, Managers and the Environment, Management as a Control System, Management by Exception, MIS: A support to the Management.

(10 Hrs)

UNIT 2:

Process Management: Management Effectiveness, planning, Organising, Staffing, Coordinating and directing, Controlling, MIS:A Tool for Management Process.

Organization Structure and Theory: Basic Model of Organization Structure, Modifications to the Basic Model of Organization Structure, Organization Behavior, Organization as a System, MIS: Organization.

(15 Hrs)

UNIT 3:

Strategic Management of Business: The Concept of Corporate Planning, Essentially Of Strategic, Planning, Development of the Business Strategies, Types of Strategies, Short-range Planning, Tools of Planning, MIS: Business Planning.

Decision Making: Decision Making Concepts, Decision Methods, Tools and Procedures, Behavioral Concepts in Decision Making, Organizational Decision Making Concepts, MIS and Decision Making concepts.

(13 Hrs)

UNIT 4:

Development of MIS: Development of Long Range Plans of the MIS, Ascertaining. The Class of Information of the MIS, Management of Quality in the MIS, Organization for Development of the MIS, MIS: The Factors of Success and Failure.

(6 Hrs)

UNIT 5:

Decision Support System: Decision Support System (DSS): Concept and Philosophy, **DSS:** Deterministic Systems, Artificial Intelligence (AI) System, Knowledge Based Expert System(KBES),MIS and Role of DSS.

(4 Hrs)

Text books:

3. W.S.Jawadekar, Management Information Systems, Tata McGraw-Hill.
4. Laudon and Laudon, Management Information Systems, Pearson Education, Asia.

Reference Books:

1. Devis and Olson, Management Information System, Tata McGraw-Hill.

BCA 5.2B-DSE-1E: Elective -I: MANAGERIAL ECONOMICS

Total: 48 Hours

UNIT 1:

Introduction: Meaning and definition- Managerial Economics, Salient features and significance, role of managerial economics, scope of managerial economics, uses/objectives of managerial economics, meaning of micro and macro economics, differences between micro and macro economics, importance and uses of micro economics, limitations of micro economics.

(8 Hrs)

UNIT 2:

Demand Analysis: Meaning of demand, individual and market demand, determinants of demand, demand-function, schedule, curve, the law of demand, exceptions to the law of demand, change in quantity demand vs change in demand, reasons for change in demand, Elasticity of demand, factors influencing elasticity of demand, price elasticity of demand and types, income elasticity of demand and types, cross elasticity of demand. Demand forecasting-meaning, significance and methods.

(10 Hrs)

UNIT 3:

Supply Analysis: Meaning of supply, determinants of supply, law of supply, extension and contraction in supply, increase and decrease in supply, causes of change in supply, elasticity of supply.

(4 Hrs)

UNIT 4:

Production Analysis and Cost Analysis: Production analysis: Concept of production function, factors of production, laws of production- the law of diminishing marginal returns, the law of variable proportions, the law of returns to scale, isoquants (only meaning), economies of scale and diseconomies of scale. Cost analysis: meaning of cost, types of cost, cost concepts-TFC, TVC, TC, AC, and MC their meaning and computation.

(14 Hrs)

UNIT 5:

Market Structures and Pricing Policies: Meaning of market, Pure and Perfect Competition & its features, Imperfect Competition & its features, Monopoly, Duopoly, Oligopoly, Monopolistic and Oligopolistic markets. Pricing policies – objective of pricing policy, factors involved in pricing policy, pricing methods- cost plus, going rate, pricing for rate of return, administered price.

(12 Hrs)

Text Books:

3. Managerial Economics, D.N. Dwivedi, Vikas publication
4. Managerial Economics - Theory and Application - D. M. Mithani

Refrence Books:

7. Managerial Economics, Stephen Hill, Palgrave Macmillan
8. Managerial Economics – Analysis, Problems and Cases, P.L. Mehta, Sultan Chand Sons, New Delhi
9. Managerial Economics – Varshney and Maheshwari, Sultan Chand and Sons, New Delhi
10. Managerial Economics – D. Salvatore, McGraw Hill, New Delhi
11. Managerial Economics – Pearson and Lewis, Prentice Hall, New Delhi
12. Managerial Economics – G.S. Gupta, T M H, New Delhi

BCA 5.2C-DSE-1E: Elective-I: DECISION SUPPORT SYSTEMS

Total: 48 Hours

UNIT 1:

Decision Support Systems: Characteristics and Capabilities of DSS, Components of DSS, The Data Management Subsystem, The Model Management Subsystem, User Interface Subsystem, The Knowledge-Based Management Subsystem, The User, DSS Hardware, DSS Classification.

(10 Hrs)

UNIT 2:

Decision Support Systems Development: Introduction to DSS development, The Traditional System Development Life cycle, Alternate Development Methodologies, Prototyping: The DSS Development Methodology, DSS Technology Levels and Tools, DSS Development Platforms, DSS Development Tool Selection, Team-Developed DSS, End User-Developed DSS, Putting the System Together.

(10 Hrs)

UNIT 3:

Group Support Systems: Group Decision Making, Communication and Collaboration, Communication Support, Collaboration Support: Computer Supported Cooperative work, Group Support Systems, Group Support Systems Technologies, Group Systems Meeting Room and Online, The GSS Meeting Process, Distance Learning, Creativity and Idea Generation.

(10 Hrs)

UNIT 4:

Decision Making and Computerized Support-1: Managers and Decision Making, Managerial-Decision Making and Information Systems, Managers and Computer Support, Computerized Decision Support and the Supporting technologies, A frame work for decision support, The concept of Decision Support systems, Group Decision Support Systems, Enterprise Information Systems, Knowledge Management systems, Expert Systems, Artificial Neural Networks, Hybrid Support Systems. Decision-Making Systems, Modelling and Support

(8 Hrs)

UNIT 5:

Decision Making and Computerized Support-2: Phases of Decision Making Process, Decision-Making: The Intelligence Phase, Decision Making: The Design Phase, Decision Making: The Choice Phase, Decision Making: Implementation PhaseThe Decision-Makers.

(10 Hrs)

Text Books:

2. Efraim Turban. Jay E. Aronson, Ting-Peng Liang: Decision Support Systems and Intelligent Systems, 8th Edition, Pearson Education, 2008. (Chapters 1, 2, 3, 6, 7, 8 excluding 8.7 to 8.9, 9, 15)

Reference Books:

2. Sprague R.H. Jr and H.J. Watson: Decision Support Systems, 4th Edition, Prentice Hall, 1996.

BCA 5.3A-DSE-2E: Elective-II: COMPUTER GRAPHICS

Total: 48 Hours

UNIT 1:

Graphics system: Introduction of Computer Graphics, Applications of CG. Video Display Devices: Cathode-Ray Tube, Raster-Scan Displays, Random-Scan Displays, Color CRT monitors, Flat-Panel Displays, Three-Dimensional viewing Devices, Raster-Scan Systems and Random-Scan Systems, Hard copy devices, input devices, Graphic software.

(8 Hrs)

UNIT 2:

Output Primitives: Points and lines, Line drawing algorithm: Digital Differential Analyzer (DDA), Bresenham's line algorithms, Circle generating algorithms. Ellipses (Example Problems), Attributes of output primitives: Line type, Line Width, Line color, Area filling, scan line algorithm**.**

(10 Hrs)

UNIT 3:

Two dimensional transformations: Basic transformation: translation, scaling and Rotation. Matrix representation and homogeneous co-ordinates, composite transformation: translation, scaling and rotations. Other Transformations, Transformations Between Coordinate Systems, Roster methods for transformation. **Two-Dimensional Viewing and clipping:** The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-To-Viewport Coordinate Transformation. Clipping algorithms: line clipping, area clipping, Polygon clipping.

(14 Hrs)

UNIT 4:

Interactive Input Methods: Physical input devices: Keyboard, touchpanels, lightpen, Graphics tablets, joysticks, mouse, trackball, interactive picture construction techniques.

Three Dimensional concepts: Three-dimensional co-ordinate systems, three-dimensional display techniques, perspective and parallel projections, polygon surfaces, curved surfaces, Quadric Surfaces, Bazier Curves and Surfaces octrees.

(10 Hrs)

UNIT 5:

Segments: Introduction, Segment Table, Function of Segmenting the Display File, More about segments, Image Transformation, Raster Techniques, Animation using Segments.

(6 Hrs)

Text books:

3. Donald Hearn & M. Pauline Baker, Computer Graphics C Version, Pearson education/PHI.
4. Computer Graphics-Steven Harrington, McGH

Reference books:

4. Principles of Interactive Computer Graphics-Newman and Sproull, McGraw Hill
5. Graphics Under C-Yeshwant Kanetkar, BPB publications.
6. James D foley, Adries Van Dam, Steven K Feiner, John F Hughes, Computer Graphics, Addison Wesley,1997.

BCA 5.3B-DSE-2E: Elective-II: COMPUTER NETWORKS

Total: 48 Hours

UNIT 1:

The Network Layer: Network Layer Design Issues, Routing Algorithms, The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Anycast Routing, Routing for Mobile Hosts, Routing in Ad Hoc Networks.

(10 Hrs)

UNIT 2:

Congestion Control Algorithms: Approaches to Congestion Control, Traffic-Aware Routing, Admission Control, Traffic Throttling, Load Shedding, Quality of Service, Application Requirements, Traffic Shaping, Packet Scheduling, Admission Control, Integrated Services, Differentiated Services, Internet working, How Networks Can Be Connected, Internetwork Routing, Packet Fragmentation.

(8 Hrs)

UNIT 3:

The Transport Layer: The Transport Service, Berkeley Sockets, Elements Of Transport Protocols, Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Multiplexing, Congestion Control

{10 Hrs)

UNIT 4:

The Internet Transport Protocols: UDP, Introduction to UDP, Remote Procedure Call, Real-Time Transport Protocols, The Internet Transport Protocols: TCP, Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, TCP Connection Management

Modeling, TCP Sliding Window, TCP Timer Management, TCP Congestion Control, Performance Issues, Performance Problems in Computer Networks, Network Performance Measurement, Host Design for Fast Networks, Fast Segment Processing, Header Compression, Protocols for Long Fat Networks, Delay-Tolerant Networking, DTN Architecture.

(10 Hrs)

UNIT 5:

The Application Layer: DNS-The Domain Name System, Electronic Mail, Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery, The World Wide Web, Architectural Overview, Static Web Pages, Dynamic Web Pages and Web Applications, HTTP—The Hyper Text Transfer Protocol, The Mobile Web, Web Search, Streaming Audio And Video, Content Delivery.

(10 Hrs)

Text Books:

3. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson
4. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach,Sixth edition, Pearson,2017 .

Reference Books:

4. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition,McGraw Hill, Indian Edition
5. L Peterson and Brusce S Davie, Computer Networks, fifth edition, ELSEVIER
6. Mayank Dave, Computer Networks, Second edition, Cengage Learning

BCA 5.3C-DSE-2E: Elective-II: OBJECT ORIENTED ANALYSIS & DESIGN

Total: 48 Hours

UNIT 1:

Introduction: Overview of object oriented system development, Object basics, The Unified Process, Modelling concepts, Modelling as a design technique, Analysis and modelling, UML diagrams, Use case Modelling, Class Modelling, State Modelling, Interaction Modelling.

(10 Hrs)

UNIT 2:

Requirements & More Modelling: Object Constraint Language, Inception, Evolutionary Requirements, Domain Models, System Sequence Diagrams, Operation Contracts.

(8 Hrs)

UNIT 3:

Design and Principles Of Design: Requirements to Design, Design Patterns, Logical Architecture, Package diagram, Design patterns, Model, View, Control pattern, Detailed design – Object design with GRASP pattern, Detailed class diagram with Visibility.

(10 Hrs)

UNIT 4:

Mapping To Code: Mapping designs to code, Test Driven development and refactoring, UML Tools and UML as blueprint

(10 Hrs)

UNIT 5:

More Patterns: Analysis update, Objects with responsibilities, Applying design patterns, Architectural Analysis, Logical Architecture Refinement, Package Design, Persistence framework with patterns.

(10 Hrs)

Text Books:

3. Michael Blaha and James Rumbaugh, "Object-oriented modeling and design with UML", Prentice-Hall of India, 2005.
4. Craig Larman. "Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development", 3rd ed, Pearson Education, 2005.

Reference Books:

6. Ali Bahrami, "Object Oriented Systems Development", McGraw-Hill, 1999.
7. Booch, Grady. Object Oriented Analysis and Design. 2nd ed. Pearson Education 2000.
8. Fowler, Martin. UML Distilled. 3rd ed. Pearson Education. 2004.
9. Lunn, Ken. Software development with UML. Palgrave Macmillan. 2003.
10. O'Docherty, Mike. Object-Oriented Analysis & Design. Wiley. 2005.

BCA 5.4A-DSE-3E: Elective-III: ARTIFICIAL INTELLIGENCE

Total: 48 Hours

UNIT 1:

Introduction: What is AI? Intelligent Agents: Agents and Environment; Rationality; the Nature of Environment; the Structure of Agents. Problem solving: Problem-Solving Agents; Example Problems; Searching for Solution; Uninformed Search Strategies.

(8 Hrs)

UNIT 2:

Informed Search, Exploration, Constraint Satisfaction, Adversial Search: Informed Search Strategies; Heuristic functions; On-line Search agents and Unknown environment. Constraint satisfaction problems; Backtracking search for CSPs, **Adversial search**: Games; Optimal decisions in games; Alpha-Beta pruning.

(10 Hrs)

UNIT 3:

Logical Agents: Knowledge-based agents; The wumpus world as an example world; Logic; propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic.

(10 Hrs)

UNIT 4:

First-Order Logic, Inference in First-Order Logic – 1: Representation revisited; Syntax and semantics of first-order logic; Using first-order logic; Knowledge engineering in first-order logic, Propositional versus first-order inference; Unification and lifting.

(10 Hrs)

UNIT 5:

Inference in First-Order Logic – 2: Forward chaining; Backward chaining; Resolution.

(10 Hrs)

Text Books:

2. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, 2nd Edition, Pearson Education, 2003.

Reference Books:

3. Elaine Rich, Kevin Knight: Artificial Intelligence, 3rd Edition, Tata McGraw Hill, 2009.
4. Nils J. Nilsson: Principles of Artificial Intelligence, Elsevier, 1980.

BCA 5.4B-DSE-3E: Elective- III: INTRODUCTION TO MACHINE LEARNING

Total: 48 Hours

UNIT 1:

Introduction, What Is Machine Learning?, Examples of Machine Learning Applications, 12 Hours Supervised Learning: Learning a Class from Examples Vapnik-Chervonenkis (VC) Dimension, Probably Approximately Correct (PAC) Learning, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm.

(10 Hrs)

UNIT 2:
Bayesian Decision Theory: Introduction, Classification, Losses and Risks, Discriminant Functions, Utility Theory, Value of information, Bayesian Networks, Influence Diagrams, Association Rules.

(10 Hrs)

UNIT 3:
Parametric Methods: Introduction, Maximum Likelihood Estimation, Evaluating an Estimator: Bias and Variance, The Bayes' Estimator, Parametric Classification, Regression, Tuning Model Complexity: Biasj Variance Dilemma, Model Selection Procedures.

(10 Hrs)

UNIT 4:
Multivariate Methods: Multivariate Data, Parameter Estimation, Estimation of Missing Values, Multivariate Normal Distribution, Multivariate Classification, Tuning Complexity, Discrete Features, Multivariate Regression. Dimensionality Reduction: Introduction, Subset Selection, Principal Components Analysis, Factor Analysis, Multidimensional Scaling, Linear Discriminant Analysis.

(10 Hrs)

UNIT 5:
Clustering: Introduction, Mixture Densities, k-Means Clustering, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the Number of Clusters.

(8 Hrs)

Text Books:

2. Ethem Alpaydin, 2004, 'Introduction to machine Learning', PHI.

Reference Books:

2. Tom M Mitchell, 1996, Machine Learning McGraw Hill Publications.

BCA 5.3C-DSE-3E: Elective-III: INTERNET OF THINGS (IOT)

Total: 48 Hours

UNIT 1:

Introduction: Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

(8 Hrs)

UNIT 2:

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

(10 Hrs)

UNIT 3:

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

(10 Hrs)

UNIT 4:

Data and Analytics for IoT: An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.

(10 Hrs)

UNIT 5:

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

(10 Hrs)

Text Books:

3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978- 9386873743)
4. Srinivasa K G, "Internet of Things",CENGAGE Leaning India, 2017

Reference Books:

3. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. (ISBN: 978-8173719547)
4. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

BCA 5.5-SEC-1E: MINI PROJECT-I

SEMESTER -VI

BCA 6.1-DSC-1F: PYTHON PROGRAMMING

Total: 48 Hours

UNIT 1:

Introduction: Installing Python, Simple program using Python, Expressions and Values, Variables and Computer, Memory, error detection, multiple line statements, Designing and using functions, functions provided by Python, Tracing function calls in memory model, omitting return statement. **Working with Text:** Creating Strings of Characters, Using Special Characters in Strings, Creating a Multiline String, Printing Information, Getting Information from the Keyboard, A Boolean Type, Choosing Statements to Execute, Nested If Statements, remembering the Results of a Boolean Expression Evaluation.

(10 Hrs)

UNIT 2:

A Modular Approach to Program Organization: Importing Modules, Defining Your Own Modules, Testing Code Semi automatically Grouping Functions Using Methods: Modules, Classes, and Methods, Calling Methods the Object-Oriented Way, Exploring String Methods, Underscores, **Storing Collections of Data Using Lists:** Storing and Accessing Data in Lists, modifying Lists, Operations on Lists, Slicing Lists, Aliasing, List Methods, Working with a List of Lists.

(**10 Hrs)**

UNIT 3:

Repeating Code Using Loops: Processing Items in a List, Processing Characters in Strings, Looping, Over a Range of Numbers, Processing Lists Using Indices, Nesting Loops in Loops, Looping Until a Condition Is Reached, Repetition Based on User Input, Controlling Loops Using Break and Continue. **Reading and Writing Files:** Kinds of files, Opening a File, Techniques for Reading Files, Files over the Internet, Writing Files, and Writing Algorithms That Use the File-Reading Techniques, Multiline Records.

(**10 Hrs)**

UNIT 4:

Storing Data Using Other Collection Types: Storing Data Using Sets, Storing Data Using Tuples, Storing Data Using Dictionaries, Inverting a Dictionary, Using the In Operator on Tuples, Sets, and Dictionaries, Comparing Collections. **Collection of New Information Object-Oriented Programming:** Understanding a Problem Domain, Function "Isinstance", Class Object, and Class Book, writing a Method in Class Book**.**

(10 Hrs)

UNIT 5:

Plugging into Python Syntax: More Special Methods. **Creating Graphical User interface:** Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Introducing few more Widgets, Object-Oriented GUIs, Keeping the Concepts from Being a GUI Mess.

(8 Hrs)

Text Books:

3. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
4. Learning with Python: How to Think Like a Computer Scientist Paperback – Allen Downey ,Jeffrey Elkner, 2015

Reference Books:

5. Introduction to Python for Computational Science and Engineering (A beginner's guide), HansFangohr.
6. Exploring Python, Timothy A. Budd, Mc Graw Hill Education.
7. Python for Informatics: Exploring Information, C harles Severance.
8. Learning Python, Fourth Edition, Mark Lutz, O'Re illy publication

BCA 6.6-DSC-1F(Pr): PYTHON PROGRAMMING LAB

Programs:

21. a. Write a python program to print "Hello Python"
    b. Write a python program to do arithmetical operations
22. Write a python program to find the area of a triangle
23. Write a python program to solve quadratic equation
24. Write a python program to swap two variables
25. Write a python program to convert Celsius to Fahrenheit
26. Write a python Program to Check if a Number is Odd or Even
27. Write a python Program to Print all Prime Numbers in an Interval
28. Write a python Program to Find the Factorial of a Number
29. Write a python Program to Display the multiplication Table
30. Write a python Program to Multiply Two Matrices
31. Write a python Program to Find LCM & GCD using functions
32. Write a python program to read a word and print the number of letters, vowels in the word.
33. Write a python program to input an array of n numbers and find separately the sum of positive numbers and negative numbers.
34. Write a python program to search an element using linear equation.
35. Write a python program to search an element using binary search
36. Write a python program to insert a number in a sorted array.
37. Write a python program to stimulate stack operation.
38. Write a python program to draw shapes & GUI controls.
39. Write a python programs to using the built-in methods of the string, list and dictionary classes.
40. Write a python program to demonstrate exception handling.

BCA 6.2A-DSE-1F: Elective-I: DATA MINING

Total: 48 Hrs

UNIT 1:

Introduction: Data Mining: Introduction, What is data mining, Data Mining Definitions, KDD Vs Data Mining, DBMS Vs Data Mining, Other related areas, DM techniques, Other Mining Problems, Issues and Challenges in DM, DM application areas, DM applications. Data Warehouse: Introduction, What is Data Warehouse, Definition, Multidimensional Data Model, OLAP operations, Warehouse Schema, Data Warehouse Architecture, Warehouse Server, Meta Data, Data Warehouse backend process.

(8 Hrs)

UNIT 2:

Association Rules: Introduction, Association Rule, Methods to discover association rules, a priori algorithm, partition algorithm, pincer-search algorithm(only concept p-84), Decision Trees :Introduction, Decision Tree, Tree Construction Principle, Best Split, Splitting Indices (only definitions of Entropy, (p-169,170),Decision Tree Construction Algorithms, CART, ID3.

(10 Hrs)

UNIT 3:

Rough Set Theory: Introduction, Definition(up to -Rough Set p- 210,211), Rough Sets and Fuzzy Sets (concept, definition of rough set member function-p226), Other Techniques :Introduction, Neural Network, Learning in NN, Unsupervised Learning, Genetic Algorithm, Support Vector Machines (concept p-250,251).

(10 Hrs)

UNIT 4:

Clustering Techniques: Introduction, Clustering Paradigms, Partitioning, Algorithms, k-Medoid Algorithms (PAM concept, Partitioning concepts. p-123), CLARA, Hierarchical Clustering, DBSCAN (concept Only, No definitions. p- 129), Categorical Clustering Algorithms, STIRR (concept p-143-excluding example)

(10 Hrs)

UNIT 5:

Web Mining: Introduction, Web Mining, Web Content Mining, Web Structure Mining (exclude example), Web Usage Mining, Text Mining, Unstructured Text, Episode Rule Discovery for Texts. Temporal and Spatial Advanced Data Mining: Introduction, Temporal Data Mining, Temporal Association Rules, Sequence Mining, The GSP Algorithm, Episode Discovery, Spatial Mining.

(10 Hrs)

Text Books:

3. Arun K. Pujari, Data Mining Techniques, , Universities Press India, 4th Edition 2016

4. Han, Jiawei and Kamber, Michelin, Data Mining: Concepts and Techniques. Morgan Kaufman Publishers, 2012.

Reference Books :

4. M Ramakrishna Murthy, Introduction to Data Mining and Soft Computing Techniques, Laxmi Publications Pvt Ltd, 2017.
5. Paul Teetor, R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics, O'reilly Cookbooks, 2011
6. Margaret H. Dunhan: Data mining-Introductory and Advanced Topics, Pearson Education.

BCA 6.2B-DSE-1F: Elective-I: MOBILE COMMUNICATIONS

Total: 48 Hours

UNIT 1:

Cellular Concept: Frequency Reuse, Channel Assignment Strategies, Interference and System Capacity, Power Control for Reducing Interference, Trunking and Grade of Service, Improving Capacity in Cellular Systems.

Mobile Radio Propagation: Large Scale path Loss- Free Space Model, Three basic propagation mechanisms, Practical Link Budget Design using Path Loss Models, Outdoor Propagation Models – Okumura, Hata, PCS Extension to Hata Model (explanations only).

(8 Hrs)

UNIT 2:

Mobile Radio Propagation: Small-Scale Fading and Multipath: Small scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions, Statistical Model for Multipath Fading Channels (Clarke‘s Model for Flat Fading only).

(10 Hrs)

UNIT 3:

System Architecture and Addressing: System architecture, The SIM concept, Addressing, Registers and subscriber data, Location registers (HLR and VLR) Security-related registers (AUC and EIR), Subscriber data, Network interfaces and configurations.

Air Interface – GSM Physical Layer: Logical channels, Physical channels, Synchronization- Frequency and clock synchronization, Adaptive frame synchronization, Mapping of logical onto physical channels, Radio subsystem link control, Channel coding, source coding and speech processing, Source coding and speech processing, Channel coding, Power-up scenario.

GSM Protocols: Protocol architecture planes, Protocol architecture of the user plane, Protocol architecture of the signaling plane, Signaling at the air interface (Um), Signaling at the A and Abis interfaces, Security-related network functions, Signaling at the user interface.

(10 Hrs)

UNIT 4:

GSM Roaming Scenarios and Handover: Mobile application part interfaces, Location registration and location update, Connection establishment and termination, Handover.

Services: Classical GSM services, Popular GSM services: SMS and MMS. **Improved data services in GSM:** GPRS, HSCSD and EDGE GPRS System architecture of GPRS, Services, Session management, mobility management and routing, Protocol architecture, Signaling plane, Interworking with IP networks, Air interface, Authentication and ciphering, Summary of GPRS . HSCSD: Architecture, Air interface, HSCSD resource allocation and capacity issues. EDGE: The EDGE concept, EDGE physical layer, modulation and coding, EDGE: effects on the GSM system architecture, ECSD and EGPRS.

(10 Hrs)

UNIT 5:

CDMA Technology : Introduction to CDMA, CDMA frequency bands, CDMA Network and System Architecture, CDMA Channel concept, Forward Logical Channels, Reverse logical Channels, CDMA frame format, CDMA System Operations (Initialization/Registration), Call Establishment, CDMA Call handoff, IS- 95B, CDMA2000, W-CDMA,UMTS, CDMA data networks, Evolution of CDMA to 3G, CDMA 2000 RAN Components, CDMA 2000 Packet Data Service.

(10 Hrs)

Text Books:

4. Theodore Rapport, ―Wireless Communications – Principles and Practice‖, Prentice Hall of India, 2nd Edition, 2007, ISBN 978-8-120-32381-0.
5. Jorg Eberspacher, Hans-Jorg Vogel, Christian Bettstetter, Christian Hartmann, "GSM– Architecture, Protocols and Services‖, Wiley, 3rd Edition, 2009,ISBN-978- 0-470-03070-7.
6. Gary J Mullet, ―Introduction To Wireless Telecommunications Systems and Networks", Cengage Learning.

BCA 6.2C-DSE-1F: Elective-I: DESIGN AND ANALYSIS OF ALGORITHM

Total: 48

Hours

UNIT1:
Introduction: Definition of algorithm, Characteristic of algorithm, Different Control Structures, Writing Structured Programs, Analysis of algorithm.

(6 Hrs)

UNIT 2:
Divide and Conquer: General Method, Binary Search, Finding Maximum & Minimum, Merge Sort, Quick Sort, Selection Sort, Strassen's matrix multiplication.

(10 Hrs)

UNIT 3:
Greedy Method: General Method, Knapsack Problem, Job Sequencing with Deadline, Minimum-cost Spanning trees, Optimal Storage on tapes, Optimal Merge Patterns, Single-Source Shortest Paths.

(10 Hrs)

UNIT 4:
Dynamic Programming: Introduction to Graphs, Definition types, Terms related To Graph, General Method, Multistage Graphs, All pair shortest paths, Optimal Binary Search trees, 0/1 –Knapsack, The traveling salesperson problem, Flow Shop Scheduling.

(12 Hrs)

UNIT 5:
Basic traversal & Search techniques: Techniques for binarytrees, Techniques for graphs: Breadth first search and Traversal, Depth first search and Traversal, Connected components and Spanning trees

(10 Hrs)

Text Books:

3. Fundamentals of Computer Algorithm, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekarn.
4. Design & Analysis of algorithm, Horowitz and Sahni

References Books:

2. The Design & Analysis of Computer Algorithms, Addison Usekey, Alfred V aho, John,E-hopcraft &

BCA 6.3A-DSE-2F: Elective-II: COMPUTER VISION

Total: 48 Hours

UNIT 1:

Introduction: CAMERAS: Pinhole Cameras, Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases, Sources, Shadows, and Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models, Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

(8 Hrs)

UNIT 2:

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Edge Detection: Noise, Estimating Derivatives, Detecting Edges, Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

(10 Hrs)

UNIT 3:

The Geometry of Multiple Views: Two Views, Stereopsis: Reconstruction, Human Stereposis, Binocular Fusion, Using More Cameras, Segmentation by Clustering: What Is Segmentation?, Human Vision: Grouping and Getstalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,

(10 Hrs)

UNIT 4:

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness, Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice, Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples.

(10 Hrs)

UNIT 5:

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations, Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization, Model- Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Application: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.

(10 Hrs)

Text Books:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.

Reference Books:

2. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.

BCA 6.3B-DSE-2F: Elective-II: CYBER SECURITY

Total: 48 Hours

UNIT 1:

Introduction: Cyber Attacks, Defence Strategies and Techniques, Guiding Principles, Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Comma Divisor, Useful Algebraic Structures, Chinese Remainder Theorem, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography – Product Ciphers, DES Construction.

(12 Hrs)

UNIT 2:

Public Key Cryptography and RSA: RSA Operations, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack, Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange.

(12 Hrs)

UNIT 3:

Key Management: Introduction, Digital Certificates, Public Key Infrastructure, Identity–based Encryption, Authentication–I - One way Authentication, Mutual Authentication, Dictionary Attacks, Authentication – II – Centalised Authentication, The Needham-Schroeder Protocol, Kerberos, Biometrics, IPSec Security at the Network Layer – Security at Different layers: Pros and Cons, IPSec in Action, Internet Key Exchange (IKE) Protocol, Security Policy and IPSEC, Virtual Private Networks, Security at the Transport Layer - Introduction, SSL Handshake Protocol, SSL Record Layer Protocol, Open SSL.

(12 Hrs)

UNIT 4:

IEEE 802.11 Wireless LAN Security: Background, Authentication, Confidentiality and Integrity, Viruses, Worms, and Other Malware, Firewalls – Basics, Practical Issues, Intrusion Prevention and Detection - Introduction, Prevention Versus Detection, Types of Instruction Detection Systems, DDoS Attacks Prevention/Detection, Web Service Security – Motivation, Technologies for Web Services, WS- Security, SAML, Other Standards.

(12 Hrs)

Text Books:

2. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition

Reference Books:

5. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-GrawHill, 3rd Edition, 2015.
6. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition.
7. Cyber Law simplified- Vivek Sood, Mc-GrawHill, 11th reprint , 2013.
8. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindra kumar, Cengage learning.

BCA 6.3C-DSE-2F: Elective-II: NETWORK SECURITY

Total: 48 Hours

UNIT 1

Cryptography: Introduction to Cryptography, Fundamentals of Cryptographic Principles, security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and blockciphers -

(8 Hrs)

UNIT 2:

Symmetric-Key Algorithms: DES—The Data Encryption Standard, AES—The Advanced Encryption Standard, Cipher Modes, Other Ciphers, Cryptanalysis, PUBLIC-KEY ALGORITHMS, RSA, DIGITAL SIGNATURES, symmetric-Key Signatures, Public-Key Signatures, Message Digests, Birthday Attack.

(14 Hrs)

UNIT 3:

Management Of Public Keys: Certificates, X.509, Public Key Infrastructures(PKI), communication security, IPsec, Firewalls, Virtual Private Networks,

(10 Hrs)

UNIT 4:

Authentication Protocols: Authentication Based on a Shared Secret Key, Establishing a Shared Key: The Diffie-Hellman Key Exchange, Authentication Using a Key Distribution Center, Authentication Using Kerberos, Authentication Using Public-Key Cryptography.

(10 Hrs)

UNIT 5:

Email Security: PGP—Pretty Good Privacy, S/MIME, WEB SECURITY, Threats, Secure Naming, SSL—The Secure Sockets Layer.

(6 Hrs)

Text Books:

3. William Stallings, “Crpyptography and Network security Principles and Practices”,Pearson/PHI.
4. Tannenbaum, wetherall, “Computer Networks:, Pearson.

Reference Books:

3. W. Mao, “Modern Cryptography – Theory and Practice”, Pearson Education.
4. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing –Prentice Hall of India.

BCA 6.4A-DSE-3F: Elective-III: MOBILE APPLICATIONS

Total: 48 Hours

UNIT 1:

Introduction to Mobile Application Development: Preliminary Considerations – Cost of Development –Importance of Mobile Strategies in Business World – Mobile Myths – Third-Party Frameworks. **Mobile Applications**: Mobile Web Presence - Marketing – Web Services for Mobile Devices – Web Services Languages.

(8 Hrs)

UNIT 2:

Mobile User Interface Design: Effective Use of Screen Real Estate – Understanding Mobile Application Users – Understanding Mobile Information Design – Understanding Mobile Platforms. **Mobile Websites:** Choosing a Mobile Web Option – Adaptive Mobile Websites – Dedicated Mobile Websites - Mobile Web Applications with HTML 5.

(10 Hrs)

UNIT 3:

Getting Started with Android: Why Target Android? - Getting the Tools You Need , Anatomy of an Android Application Android User Interface: Understanding Components of a Screen – Adapting to Display Orientation – Managing Changes to Screen Orientation – Creating User Interface Programmatically – Listening for UI Notifications.

(10 Hrs)

UNIT 4:

Types of Views: Designing User interface using Views – Displaying Pictures and Menus with Views – Analog Clock and Digital Clock Views Data Persistence: Saving and loading

user Preferences - Persisting data to files – Creating and using Data bases– Content Providers

(10 Hrs)

UNIT 5:

Android Messaging and Networking: SMS Messaging – Sending SMS – Receiving SMS - Sending E-mail Location Based Services: Displaying Maps – Obtaining Map API Key – Displaying the Map – Zoom Control – Changing Views – Navigating – Adding Markers – Getting the Location that was Touched – Geocoding and Reverse Geocoding .

(10 Hrs)

Text Books:

3. Professional Mobile Application Development, Jeff McWherter and Scott Gowell,2012, Wrox Publishers.
4. Beginning Android Application Development, Wei – Meng Lee, Wiley, 2011.

Reference Books:

4. Professional Android 4 Application Development, Reto Meier, Wrox Publications, 2012.
5. Beginning iOS6 Development: Exploring the iOS SDK, David Mark, Jack Nutting, Jeff LaMouche, and Fredric Olsson, Apress, 2013.
6. Android in Practice, Charlie Collins, Michael Galpin and Matthias Kappler, Dream Tech, 2012

BCA 6.4B-DSE-3F: Elective-III: CLOUD COMPUTING

Total: 48 Hours

UNIT 1:

Cloud Computing Basics: Overview, Applications, Intranet and the Cloud, First Movers in the Cloud; The Use of Cloud Computing, Benefits, Security concerns, regulatory issues; Overview of different cloud computing applications that are implemented; Business case for implementing a Cloud: Cloud Computing Services, Applications help to the business, deleting the data center, Saleforce.com, Thomson Reuters.

(10 Hrs)

UNIT 2:

Cloud Computing Technology: Hardware and Infrastructure: Clients, Security, Network, Services; Accessing the Clouds: Platforms, Web applications, Web APIs, Web Browsers.

(8 Hrs)

UNIT 3:

Cloud Storage: Overview, Cloud Storage providers, Standards: Applications, Client, Infrastructure, Services. **(8 Hrs)**

UNIT 4:

Cloud Computing at Work: Software as a service: Overview, Driving Forces, Company offerings, Industries; Software plus services: Overview, Mobile Device Integration, Providers, Microsoft Online; Developing Applications: Google, Microsoft, Intuit QuickBase, Cast Iron Cloud, Bungee Connect, Development: Google, Sales Force, Azure.

(12 Hrs)

UNIT 5:

Local Clouds and Thin Clients: Virtualization, server solutions, Thin Clients; Migrating to the clouds: Cloud services for individuals, Cloud services aimed at Mid-market, and Enterprise-Class, Migration; Best practices and the future of Cloud computing: analyzing the services, Best practices.

(10 Hrs)

Text Books:

2. Cloud Computing a Practical approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, Tata McGraw-HILL, 2010 Edition.

Reference Books:

5. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, S. Thamari Selvi, McGraw Hill Education (India) Private Limited.
6. Distributed and Cloud Computing, Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Morgan Kaufmann Publishers 2012.
7. Cloud computing, Barrie Sosinsky, Wiley India.
8. Cloud Computing, Kumar Saurabh, 2nd Edition, Wiley, India

BCA 6.4C-DSE-3F: Elective-III: OPERATION RESEARCH

Total: 48 Hours

UNIT 1:

Linear Programming Problems: Origin and development of operations Research, Liner programming Problem-formulation of Linear Programming problem, Graphical solution. Theory of simplex method. Use of artificial variables and their solution, Duality theory and Sensitivity Analysis.

(12 Hrs)

UNIT 2:

Transportation Problem: Mathematical formulation of transportation problem, Initial Basic Feasible solution, North West corner rule, Matrix minima method, Vogal approximation method, for balanced Transportation Problem only.

(10 Hrs)

UNIT 3:

Assignment Problem: Mathematical formulation of on Assignment Problem, Assignment algorithm and simple illustrations.

(8 Hrs)

UNIT 4:

Network Analysis: Basic components of Network, Rules Ofdrawing Network diagram, Time calculation in Networks, Critical Path Method and Project E1valuation and Review Techniques, Algorithm and flow chart for CPM & PERT.

(10 Hrs)

UNIT 5:

Theory of Games: Two-Person Zero – sum Games, The Maxmin and Minmax principle, Saddle point and values of the Game, Game without Saddle points, Mixed strategies, Solution for 2x2games,Graphical method Dominance property, Linear programming method and their solutions.

(8 Hrs)

Text Books:

4. Taha, Operations Research, 7/e, Pearson Education
5. Hamady A. Taha, Operations Research, Collin Mac Millan 1982.
6. Kani Swarup, P.K. Gupta and Man Mohan, Operation Research, Sultan Chand and Sons, 4793/23, Darya Ganj, New Delhi-110 002

Reference Books :

4. Billey E.Gillett, Introduction to Operations Research, Himalya Publishing House, Delhi 1979

5. Frederick S. Hiller,Gaxald J. Deibermann, Operation Research, Holden Day Inc. 1974
6. Narag A.S., Linear Programming and Decision Making, Sultan Chand and Sons.

BCA 6.5-SEC-1F: MINI PROJECT-II

Theory, Practical and Project Examination Scheme

Question Paper Pattern for all semester except AECC

4. Question number 1-12 carries 2 marks to answer any 10 questions : **20 Marks**
5. Question number 13-21 carries 5 marks to answer any 6 questions : **30 Marks**
6. Question number 22-26 carries 10 marks to answer any 3 questions : **30 Marks**

Total: 80 Marks

Practical Evaluation Scheme

Practical Examination- 40 Marks **Duration - 3 Hours**.

Certified Journal is compulsory for appearing Practical Examination, students shall be given two programming assignments taking into consideration of duration of the time allotted to students for writing, typing and executing the programs.

Algorithm/Program writing : **14 Marks (7 Marks each)**
Execution : **16 Marks (8 Marks each)**
(Includes program code correctness and correct execution results)
Journal : **05 Marks**
Viva-Voce : **05 Marks**

Total : 40 Marks

Execution of the Project:

- The students are required to carry out the project in a group of two students under the guidance of course teacher.
- Project work problem statement shall be identified by the students with the help of the course teachers and students shall submit the synopsis/project proposal of the same during the second week of the commencement of V and VI semester BCA course.
- During project development students are expected to define a project problem, do requirements analysis, systems design, software development, apply testing strategies and do documentation with an overall emphasis on the development of a robust, efficient and reliable software systems.
- No change in the title of the project work shall be allowed after 3rd week of the commencement of V and VI semester BCA course.
- The project development process has to be consistent and should follow standards identified by the guide monitoring the project work.
- There is no restriction on use of hardwares and softwares for carrying out the project work except that ready application packages are not allowed.
- The students have to submit the project dissertation of the project work carried out in one hard copy along with soft copy written on compact disc.

Project Evaluation Scheme : Main Examination

Max. Marks: 40 **Time: 3 Hours**

1. Dissertation/Project Report evaluation : **20 Marks**

2. Presentation/Demo of the application developed : **10 Marks**
(navigation of the application, features incorporated, data validation, UI, reports, etc.)

3. Viva-voce : **10 Marks**

Total : 40 Marks

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KARNATAK UNIVERSITY, DHARWAD

B.Sc. Programme

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DRAFT SYLLABUS FOR

COMPUTER SCIENCE (CS OPTIONAL)

UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

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Effective from 2020-21

B.Sc. Programme structure under CBCS

Semester	*Core			Elective			Ability Enhancement Course						Total Credits
	DSC			**DSE			***SEC			AECC			
	Course	L+T+P	Credit	Course	L+T+P	Credit	Course	L+T+P	Credit	Course	L+T+P	Credit	
I	DSC-1A	4+0+4	4+2=6							English-1	2+1+0	2+1=3	26
	DSC-2A	4+0+4	4+2=6							MIL-1	2+1+0	2+1=3	
	DSC-3A	4+0+4	4+2=6							ENVIRONMENTAL SCIENCE	2+0+0	2+0=2	
II	DSC-1B	4+0+4	4+2=6							English-2	2+1+0	2+1=3	26
	DSC-2B	4+0+4	4+2=6							MIL-2	2+1+0	2+1=3	
	DSC-3B	4+0+4	4+2=6							CONSTITUTION OF INDIA	2+0+0	2+0=2	
III	DSC-1C	4+0+4	4+2=6							English-3	2+1+0	2+1=3	24
	DSC-2C	4+0+4	4+2=6							MIL-3	2+1+0	2+1=3	
	DSC-3C	4+0+4	4+2=6										
IV	DSC-1D	4+0+4	4+2=6							English-4	2+1=0	2+1=3	24
	DSC-2D	4+0+4	4+2=6							MIL-4	2+1=0	2+1=3	
	DSC-3D	4+0+4	4+2=6										
V				DSE-1E	4+0+4	4+2=6	SEC-1E	2+0+0	2				22
				DSE-2E	4+0+4	4+2=6	SEC-2E	2+0+0	2				
				DSE-3E	4+0+4	4+2=6							
VI				DSE-1F	4+0+4	4+2=6	SEC-1F	2+0+0	2				22
				DSE-2F	4+0+4	4+2=6	SEC-2F	2+0+0	2				
				DSE-3F	4+0+4	4+2=6							
TOTAL			72			36			08			28	144

L+T+P= Lecturing in Theory + Tutorial + Practical Hours per Week (no tutorial for practical subject).
*If the core course is Mathematics, there shall be two papers of 75 marks each. Then L+T+P = (2x3)+(2x1)+0, but credit shall be 6 only.
** Each DSE shall have at least two papers and student shall choose any one paper from each DSE.
**** SEC shall be from any one DSC and study two each in 5th and 6th semesters (SEC may be practical or theory for 2 credits only).

Note: 1. Each DSC/DSE Shall have 60Hours syllabus / semester for 100 marks in theory (80 Sem.End exam +20 IA Exam) and 52 Hours practical/sem for 50 marks(40 Sem. End exam +10 IAExam).

2. English/MIL Shall have 45 Hours syllabus / semester for 100 marks in theory (80 Sem. End exam +20 IA Exam).

3. Environmental Science/ Constitution of India / SEC shall have 30 Hours syllabus / semester for 50 marks in theory/ Practical (40 Sem. End exams +10 IA Exam)

Karnatak University, Dharwad

CBCS syllabus for Under Graduate Programme in Computer Science (Opt.) as

DISCIPLINE SPECIFIC COURSE (DSC) and DISCIPLINE SPECIFIC ELECTIVE (DEC)

Effective from 2020-21

Sem	Theory/ Practical	Subject Code	Subject Title	Instruction hour per week	Total hours of Syllabus / Sem	Duration of Exam	Internal Assessment Marks	Sem final Exam Marks	Total Marks	Credits
I	Theory	DSC(CST: A)	Problem solving techniques using 'C'	04 Hours	60	03 Hours	20	80	100	04
	Practical	DSC(CSPr: A)	C Programming Lab	04 Hours	52	03 Hours	10	40	50	02
II	Theory	DSC(CST: B)	Digital Logic & Computer Design	04 Hours	60	03 Hours	20	80	100	04
	Practical	DSC(CSPr: B)	8085 Lab	04 Hours	52	03 Hours	10	40	50	02
III	Theory	DSC(CST: C)	Data Structures using C	04 Hours	60	03 Hours	20	80	100	04
	Practical	DSC(CSPr: C)	DS Lab	04 Hours	52	03 Hours	10	40	50	02
IV	Theory	DSC(CST: D)	OOP concepts using C++	04 Hours	60	03 Hours	20	80	100	04
	Practical	DSC(CSPr: D)	OOP Lab	04 Hours	52	03 Hours	10	40	50	02
V	*Th P-I	DSE(CST: P-I E)	DBMS	04 Hours	60	03 Hours	20	80	100	04
	*Th P-II	DSE (CST: P-II E)	HTML & XML Programming	04 Hours	60	03 Hours	20	80	100	
	Pract P-I	DSE (CSPr: P-I E)	DBMS Lab	04 Hours	52	03 Hours	10	40	50	02
	Pract P-II	DSE (CSPr: P-II E)	HTML & XML Lab	04 Hours	52	03 Hours	10	40	50	
VI	*Th P-I	DSE (CST: P-I F)	Programming with Java	04 Hours	60	03 Hours	20	80	100	04
	*Th P-II	DSE (CST: P-II F)	Introduction to Computer Graphics	04 Hours	60	03 Hours	20	80	100	
	Pract P-I	DSE (CSPr: P-I F)	Java Lab	04 Hours	52	03 Hours	10	40	50	02
	Pract P-II	DSE (CSPr: P-II F)	CG Lab	04 Hours	52	03 Hours	10	40	50	
Total							180	720	900	36

*** Candidate shall choose either Paper–I or Paper-II but not both in DSE Theory and Practical.**

SKILL ENHANCEMENT COURSE (SEC) for Computer Science opted as DSC

Semester	Theory	Subject Code	Instruction hour per week	Total hours of Syllabus / Sem	Duration of Exam	Internal Assessment Marks	Sem final Exam Marks	Total Marks	Credits
V	Theory	SEC-CS- 1E	02 Hours	30	1.5 Hours	10	40	50	02
V	Theory	SEC-CS- 2E	02 Hours	30	1.5 Hours	10	40	50	02
VI	Theory	SEC-CS- 1F	02 Hours	30	1.5 Hours	10	40	50	02
VI	Theory	SEC-CS- 2F	02 Hours	30	1.5 Hours	10	40	50	02
Total						40	160	200	08

Skill Enhancement Course (SEC) Subject Titles:

S. No.	Subject Code	Title
1	SEC-CS-1E	Artificial Intelligence
2	SEC-CS-2E	Data Mining
3	SEC-CS-1F	Mobile Communications
4	SEC-CS-2F	Cyber Security

Discipline Specific Course(DSC) under CBCS

B.Sc. Semester -I

COMPUTER SCIENCE: CST: A

Problem solving techniques using 'C'

Credits	**I. Theory**	**: 04**	**Theory class 4Hours /week. Total theory: 60Lectures** **80 Marks for Semester End Examination (3 Hours) & 20 marks IA**
	II. Practical	**: 02**	**Practical: 4 Hours /week Total Practical: 52 Hours.** **40 marks for Semester End Examination (3 Hours) & 10 marks IA**
	Total Credits	**: 06**	**Total Theory marks 100 and Practical marks 50**

Unit I: **15 Hours**

Computer Fundamentals: History & Evolution of Computers. Characteristics, Types and Generations of Computers. System logical Organization: Von - Neumann concept of computer with block diagram: Components of Computer & their functions. Input Devices, Output Devices, Storage Devices. Processor & Main Memory: Central Processing Unit: ALU & CU. Architecture of Processor & Main Memory, Processor Registers, Main Memory: Organization of Main Memory, Main Memory Capacity. RAM, ROM, PROM, EPROM, EEPROM, Cache Memory.

Computer Software: Types of Software: System Software & Application Software. Translators: Compiler, Interpreter Linker, Loader and Editor. Computer Languages: Machine Level, Assembly Level & High Level, Their Merits & Demerits. Planning a Computer Program: Algorithm, Flowchart and Pseudo code.

Unit II: **10 Hours**

Introduction to C: Over View of C: Introduction. Importance and Features of C. Structure of a C Program. Sample C Programs. Creating and Executing a C Program. Block diagram of execution of C program. Basic Concepts : C Character Set. C tokens: keywords, identifiers, constants and variables. Data types. Declaration & initialization of variables. Symbolic constants. Formatted I/O functions: *printf* and *scanf*: control stings and escape sequences, output specifications with *printf* functions. Unformatted i/o functions to read and display single character and a string: *getchar, putchar, gets* and *puts* functions.

Unit III: **10 Hours**

Operators & Expressions : Arithmetic operators, Relational operators, Logical operators, Assignment operators, increment & decrement operators, bitwise operators, conditional operator and special operators. Computational Problems, Operator Precedence and Associatively. Evaluation of arithmetic expressions, Type conversion.

Unit IV: **10 Hours**

Control Structures (Branching & Looping) : Decision making with *if* statements: *simple if, if _ else* statements, *nested if _ else* and *else_if ladder. Switch case* Statement. *goto, break&continue* statements. Looping Statements : Entry controlled and Exit controlled, *while, do-while&for* loops. Nested loops.

Unit V: **15 Hours**

Arrays and Strings: One Dimensional arrays: Declaration, Initialization and Memory representation. Two Dimensional arrays : Declaration, Initialization and Memory representation. Declaring & Initializing string variables. String handling functions: *strlen, strcmp, strcpy and strcat.* Character handling functions: *toascii, toupper, tolower, isalpha, isnumeric* etc.

User Defined Functions: Need for user defined functions. Format of C user defined functions. Components of user defined functions: return type, name, parameter list, function body, return statement and function call. Categories of User defined functions: with and without parameters and return type

Structures & Unions: Definition of Structure & Union. Declaring structure variables, Accessing structure members, Structure members initialization, Difference between structure and union.

Text Books:

1. P. K. Sinha & Priti Sinha :Computer Fundamentals (BPB)
2. V. Rajaraman : Computer Fundamentals
3. E. Balguruswamy: Programming in ANSI C (TMH)
4. V. Rajaraman : Programming in C (PHI – EEE)
5. Yashwant Kanitkar : Let us C
6. P.B. Kottur : Programming in C (Sapna Book House)

Reference Books :

1. Moris mano: Computer Organization & Architecture
2. Norton : Computer Applications
3. Kamthane : Programming with ANSI and TURBO C(Pearson Education)
4. S. Byron Gottfried: Programming with C (TMH)
5. Kernighan & Ritche : The C Programming Language.(PHI)

COMPUTER SCIENCE LAB: CSPr: A

Sample Programs: Write algorithm, draw flowchart and write 'C' programs for the following:

1. Find the area and circumference of a circle
2. Check whether the given number is prime or not.
3. Generate prime numbers up to N terms
4. Check whether a given number is palindrome or not.
5. Find the sum of digits of a given number.
6. Read coefficients a, b and c and to display proper message about the roots of quadratic equation (Illustration *switch case* statement)
7. Display multiplication table (nested for loops)
8. Find the factorial of a number
9. Convert an integer to binary.
10. Calculate x raised to y
11. Find a length of a string without using built in function
12. Check whether the given string is palindrome or not
13. Read a string and find the number of alphabets, digits, spaces and special characters. (Illustration of character functions).
14. Illustrate string functions - *strcmp*, *strcpy, strlen* and *strcat*
15. Find maximum and minimum integers in an array.

Distribution of Marks:

Assessment Criteria		Marks
Program – 1	Writing the Program	05
	Flowchart	02
	Execution	08
Program -2	Writing the Program	05
	Flowchart	02
	Execution	08
Viva Voice based on 'C' Programming		05
Journal		05
Total		**40**

Discipline Specific Course (DSC) under CBCS

B.Sc. Semester - II

COMPUTER SCIENCE:CST: B

Digital Logic & Computer Design

Credits	**I. Theory**	**: 04**	**Theory class 4Hours / week Total theory: 60Lectures** **80 Marks for Semester End Examination (3 Hours) & 20 marks IA**
	II. Practical	**: 02**	**Practical: 4 Hours / week Total Practical: 52 Hours.** **40 marks for Semester End Examination (3 Hours) & 10 marks IA**
	Total Credits	**: 06**	**Total Theory marks 100 and Practical marks 50**

Unit I: 05 Hours

Number system and codes: Binary number system, decimal number system, octal number system, hexadecimal number system. Bases inter conversions. Representation of negative numbers 1's and 2's complements. Codes: BCD, GRAY, EXCESS-3.

Unit II: 15 Hours

Boolean algebra and logic systems: Laws of Boolean algebra, Boolean laws. Evaluation of Boolean expression, De Morgan's theorems and proof, simplification on Boolean expressions using Boolean laws Basic gates (AND, OR, NOT): truth table, Definition, Boolean expression and symbols, universal gates (NAND, NOR): truth table, definition, Boolean expression and symbols, design of basic gates using NAND and NOR gates. Logical gates using NAND and NOR, Design of given Boolean expression using basic gates or NAND gate or NOR gate. XOR and XNOR gate (Definition, Boolean expression and symbols, truth table).

Unit III: 15 Hours

Simplification of Boolean functions: SOP and POS form, min term and max term, expression of Boolean equation in Min and Max term(conversion of SOP and POS forms to standard form) K-map method: Rules, simplification of Boolean equation using K-map (up to 4 variables), without and with don't-care condition, Implementation using basic gates or NAND gate or NOR gate, Quine - Mc Cluskey Tabulation method ,determination and selection of prime implicates.

Unit IV: 15 Hours

Combination logic: Design procedure, design of half adder and full adder, half subtract or and full sub tractor. Code converters:- BCD to Excess 3 code, gray code, magnitude comparator, encoders (BCD to decimal), decoder (decimal to BCD), multiplexer(4:1 and 8:1), de-multiplexer(1:4 and 1:8).

Unit V: 10 Hours

Sequential logic: Introduction, Flip-flops – SR,JK, D, T, JK-MS (Detailed Study) Registers – Introduction, shift register- types and applications. Counters – synchronous and asynchronous counters (Up, down, up down).

Text Books:

3. M.Moris Mano, Computer System Architecture, 2nd Edition Prentice Hall of India.

Reference Books:

19. Heuring and Jordan, Computer systems design and architecture, Pearson Education
20. William Stallings, Computer Organization and Architecture, Pearson Education 2003.
21. Andrew S Tenenbaum, Structured Computer Organization, 3rd Edition, Prentice Hall of India(1990).

COMPUTER SCIENCE LAB: CSPr: B

Sample Programs: Microprocessor (8085) Lab

17. 8- bit Subtraction
18. 8- bit Division
19. Palindrome
20. Ascending order
21. Descending order
22. 16- bit Addition
23. BCD to binary conversion
24. Binary to BCD conversion
25. Addition of a series of numbers
26. 8- bit Multiplication
27. Largest number in a list
28. Stepper Motor
29. Traffic Light
30. LCD
31. Segment display

Note: All the programs to be executed on Simulator

Distribution of Marks:

Assessment Criteria		Marks
Program – 1	Writing the Program	05
	Algorithm	02
	Execution	08
Program -2	Writing the Program	05
	Algorithm	02
	Execution	08
Viva Voice based on Digital Logic & Computer Design		05
Journal		05

Total	**40**

Discipline Specific Course (DSC) under CBCS

B.Sc. Semester - III

COMPUTER SCIENCE: CST: C

Data Structures using 'C'

Credits	**I. Theory**	**: 04**	**Theory class 4Hours / week. Total theory: 60Lectures** **80 Marks for Semester End Examination (3 Hours) & 20 marks IA**
	II. Practical	**: 02**	**Practical: 4 Hours / week Total Practical: 52 Hours.** **40 marks for Semester End Examination (3 Hours) & 10 marks IA**
	Total Credits	**: 06**	**Total Theory marks 100 and Practical marks 50**

Unit I: **12 Hours**

Introduction to data structures: Definition. Classification of data structures : primitive & non primitive. Operations on data structures : insert, delete, search

Structures & Unions: Structure Definition, Advantages of Structure, Declaring structure variables, Accessing structure members, Structure members initialization, Array of Structures. Union Definition. Difference between structure and union.

Pointers & memory Allocation: Understanding pointers. Declaring and initializing pointers, accessing address and value of variables using pointers. Pointer and array. Pointer Arithmetic. Advantages and disadvantages of using pointers . Dynamic memory allocation : Meaning of static & dynamic memory allocation. Memory allocating and de-allocating functions: *malloc*, *calloc*, *realloc* and *free*

Unit II: **12 Hours**

Files: Introduction: Types of files : Binary and Text files. Concept of file pointer & EOF. Basic file operations : opening a file, closing a file. File I/O operations: writing into the file and reading from the file: *fopen*, *fclose*, *fprintf*, *fscanf*, *getc*, *putc*, *getw*, *putw*. Error handling functions : *feof*, *ferror*. File pointer positioning functions : *ftell*, *fseek* and *rewind*.

Recursive functions: Definition. Types of recursion: Direct & Indirect. Execution of recursive programs: Fibonacci numbers, GCD, Binomial coefficient ${}^{n}C_{r}$, Towers of Hanoi.

Unit III: **12 Hours**

Sorting & Searching: Sorting : Definition. Types of sorting: Internal & External sorting . Different Internal sorting Techniques: Bubble sort,

Selection sort, Quick sort, Insertion sort, Merge sort. Searching : Basic search Techniques : Sequential search & binary search- Iterative & Recursive Methods. Comparison between sequential and binary search.

Unit IV: **12 Hours**

Stacks and Queues :Stack : Definition. Representation of stack using array. Operations on Stack. Applications of stacks : Infix, postfix and prefix notations. Conversion from infix to postfix using stack. Evaluation of postfix expression using stack. Application of stack in function calls. Queue : Definition. Representing queue using array. Operations on simple queue. Types of queue :Simple queue, circular queue, double ended queue(dqueue) and priority queue.

Unit V: **12 Hours**

Linked List : Definition, Components of Linked List. Advantages & disadvantages of linked list over arrays. Types of linked list : Singly linked list, doubly linked list, circular linked list and circular doubly linked list. Operations on Singly linked list.

Trees: Introduction: Definition. Concepts of binary tree, strictly binary tree, complete binary tree, binary search tree and heap tree. Tree terminologies: root node, parent node, ancestors of a node, siblings, terminal & non terminal nodes, degree of a node. Level, Edge, Path and depth. Binary tree : Array representation of binary tree. Traversal of binary tree: *preorder, inorder* and *postorder* traversal. Reconstruction of a binary tree when any two of the traversals are given.

Text Books:

1. Y. Kanitkar : Data Structures Using C (BPB)
2. Kottur: Data Structure Using C
3. Padma Reddy : Data Structure Using C

Reference Books:

1. Kernighan & Ritche : The C Programming Language.(PHI)
2. Tanenbaum : Data structures using C (Pearson Education)
3. Kamathane : Introduction to Data structures (Pearson Education)
4. Horowitz and Sahane : Data Structures

COMPUTER SCIENCE LAB:CSPr: C

In a batch of ten students, at least five different experiments may be given in the practical examination. Selection of experiments may be done by the students based on the picking up of chits. Viva questions may be asked on any of the experiments prescribed in the practical syllabus.

Sample Programs: Write 'C' programs for the following:

1. Create two files to store even and odd numbers.
2. Implement Towers of Hanoi.
3. Generate first n Fib numbers using recursive function
4. Find GCD of two numbers using recursive function
5. Sort the given list using selection sort technique.
6. Sort the given list using bubble sort technique.
7. Sort the given list using insertion sort technique.
8. Sort the given list using quick sort technique.
9. Sort the given list using merge sort technique.
10. Search an element using linear search technique.
11. Search an element using recursive binary search technique.
12. Implement Stack.
13. Implement simple queue.
14. Implement singly linked list.
15. Display traversal of a binary tree.

Distribution of Marks:

Assessment Criteria		Marks
Program – 1	Writing the Program	05
	Algorithm / Flowchart	02
	Execution and Formatting	08
Program -2	Writing the Program	05
	Algorithm / Flowchart	02
	Execution and Formatting	08
Viva Voice based on Data Structures		05
Journal		05
Total		**40**

Discipline Specific Course (DSC) under CBCS

B.Sc. Semester - IV

COMPUTER SCIENCE:CST: D

OOP Concepts using C++

			Theory class 4Hours / week. Total theory: 60Lectures
	I. Theory	**: 04**	**80 Marks for Semester End Examination (3 Hours) & 20 marks IA**
Credits			**Practical: 4 Hours / week Total Practical: 52 Hours.**
	II. Practical	**: 02**	**40 marks for Semester End Examination (3 Hours) & 10 marks IA**
	Total Credits	**: 06**	**Total Theory marks 100 and Practical marks 50**

Unit I: **12 Hours**

Introduction: Procedural language, Definition of OOP. Basic concepts of OOPs, Object, Class, Data Abstraction, Data Encapsulation, Data Hiding, Inheritance, Polymorphism, Dynamic binding and message passing.

Introduction to C++; C++ features: The stream classes, *cin &cout* objects, C++ Comments, The const qualifier, manipulators: *endl, setw, setprecision.* The scope resolution operator, new and delete operators.

User Defined Functions: Declaration, Function definition, Function calling. Parameters passing techniques: pass by value, pass by reference. Default arguments. Function overloading, Inline functions.

Unit II: **12 Hours**

Objects & Classes: Definition of Objects & Classes. Class declaration. Class members, data members & member functions. Declaring member functions inside the class & outside the class. Declaring object of a class. Accessing member functions & data members using objects. Class member visibility with access specifiers- private, public & protected. Memory representation for objects & member functions. Constructors: Types of constructors: Default arguments, Dynamic Constructors and Copy constructors, Destructors. Objects as arguments, returning an object. Array of objects. Friend functions.

Unit III: **12 Hours**

Operator overloading: Definition, the operator keyword. Syntax of overloading unary operators & binary operators. Examples of overloading arithmetic operators, comparison operators, and increment operators. Limitations of overloading increment operators. Operator overloading using friend functions. Overloading of insertion & extraction operators. Data conversion: conversion between basic data types, conversion between objects & basic data types & conversion between objects of different classed. Nameless temporary objects. The this pointer, Accessing data members and returning values using this operator

Unit IV: **12 Hours**

Inheritance: Definition. Base class & Derived class. Public and private inheritance. Accessing base class members in derived class with access modes private, protected and public. Types of inheritance: simple inheritance, multilevel inheritance, multiple inheritance, Hybrid inheritance and multipath inheritance. Constructors and destructors in simple inheritance. Member function overriding, class within a class. Containership. Friend classes.

Unit V: **12 Hours**

Templates and virtual functions: Templates: Class Templates, Function Templates, Member function as Template function. Virtual Functions : Accessing member functions of base class and derived class using pointers to objects. Virtual member function. Need of virtual functions. Accessing virtual functions using pointers. Dynamic binding. Virtual pointers. Pure virtual functions and Abstract Classes.

Text books:

Sl. No.	Title of the book	Author
1	Object Oriented Programming with C++	E Balgurusamy
2	Programming in C++	Padmareddy

Reference books:

Sl. No.	Title of the book	Author
1	C++ Primer	Lipman
2	Complete Reference – C++	Shildt
3	Object Oriented Programming with ANSI & Turbo C++	Kamthane

COMPUTER SCIENCE LAB:CSPr: D

Sample Programs: Write C++ programs for the following:

1. Illustrate default arguments.
2. Illustrate inline function.
3. Illustrate function overloading.
4. Demonstrate constructor overloading.
5. Implement stack operations.
6. Implement queue operations.
7. Add two distance variables.
8. Add two time variables.
9. Concatenate two strings by overloading + operators.
10. Compare two strings by overloading =, < and > operators.
11. Prepare student report using simple inheritance technique.
12. Swap two objects using friend functions.
13. Find the maximum of two objects using friend function.
14. Read, display and add two M x N matrices using operator overloading.
15. Read, display and multiply two M x N matrices using operator overloading

Distribution of Marks:

Assessment Criteria		Marks
Program – 1	Writing the Program	07
	Execution	08
Program -2	Writing the Program	07
	Execution	08
Viva Voice based on C++ programming		05
Journal		05
Total		**40**

Discipline Specific Elective (DSE) under CBCS

B.Sc. Semester - V

COMPUTER SCIENCE: Paper-I (CST:P-I E)

(Candidate shall choose either Paper-I or Paper-II)

Database management System

			Theory class 4Hours / week. Total theory: 60Lectures
	I. Theory	**: 04**	**80 Marks for Semester End Examination (3 Hours) & 20 marks IA**
Credits			**Practical: 4 Hours / week Total Practical: 52 Hours.**
	II. Practical	**: 02**	**40 marks for Semester End Examination (3 Hours) & 10 marks IA**
	Total Credits	**: 06**	**Total Theory marks 100 and Practical marks 50**

Unit I: **12 Hours**

Introduction: Concepts of Data, data base and DBMS and data base system. Characteristics of data base approach. People associated with DBMS. Advantages of DBMS. Data base system concepts & Architecture: Schema & instances. Three schema architecture of DBMS. Data independence. Database languages and interfaces. Database system environment. Classification of DBMS

Unit II: **12 Hours**

Data modeling using Entity – Relationship Model: Data Models. Types of data models. E – R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute and domain of an attribute. Relationships between the entities. Relationship types. Degree and cardinality ratio of a relationship. Notion of E-R diagram. Proper naming of schema constructs.

Relational Data Model : Relational model concepts : Domains, attributes, tuples and relations. Characteristics of relations. Relational model constraints : Domain constrains, key constraints, primary & foreign key constraints, integrity constraints and null values. Operations on relations: insert, delete and update operations.

Unit III: **12 Hours**

Relational Algebra : Basic Relational Algebra operations : SELECT, PROJECT and RENAME. Set theoretical operations on relations : UNION, INTERSECTION, MINUS and CROSS PRODUCT. JOIN operations : Theta join, Equi join, Natural join. Aggregate functions and grouping.

Unit IV: **12 Hours**

Functional Dependencies & Normalization: Informal Design Guidelines for Relational Schema: insertion, deletion and modification anomalies. Functional Dependencies: Definition, Inference Rules. Normal Forms based on Primary keys: First, Second and Third Normal Forms.

Unit V: **12 Hours**

Transaction Processing Concepts: Introduction to transaction Processing: Single-user & multi-user systems. Transactions: read & write operations. Need of concurrency control:

The lost update problem, Dirty read problem. Types of failures. Transaction states. Desirable properties (ACID properties) of Transactions. Concurrency Control Techniques: Locks and Time stamp Ordering. Deadlock & Starvation.

Reference Books:

1. Elmasri &Navathe : Fundamentals of Database System(Pearson Education).
2. Ramkrishnan Gehrae : Database Management System(TMH).
3. C J Date : Introduction to Database System.
4. Raghu Ram Krishnan: Database Management Systems (TMH).
5. Martin : Principles of Database Management (THI)
6. Jefrey D Ullman: Principles of Database System.
7. Sunderarman : Oracle Programming a Primer. Pearson Education
8. Oracle Press : Oracle Complete Reference.

COMPUTER SCIENCE LAB: CSPr: F

Paper – I: SQL Programs

Database **1**: Insurance

Consider the following relations for an accident recording database application

PERSON (Driverid :String, name:String, Address: String)
CAR (Regno: String, Model(Company): String,Year: int)
ACCIDENT (Reportno :Number, Date: Date, Location: String)
OWNS (Driverid: String, Regno: String)
PARTICIPATED (Driverid:String, Regno:String,
Reportno:int,Damageamount: real)

a. Create the above tables by properly specifying the primary key.
b. Enter At least five tuples for each relation.
c. Execute the following queries
   1. Demonstrate how to update the damage amount for the car with a specific regno.
   2. List the drivers (name, address & damage amt) who have participated in an accident

Database **2**: COMPANY (SHIPMENT)

Consider the following relations for an order processing database application in a company

CUSTOMER (Customerno:Integer,Customername:String,City:String)
ORDER (Orderno:integer,orderDate:date,
customerno:int,Orderamount:dec)
ITEM (Itemno:int,unitprice:decimal)
ORDERITEM (Orderno:int,Itemno:int,Quantity: int)
WAREHOUSE (Warehno:int,City:String)
SHIPMENT (Orderno:int,Warehno:int,Shipdate:Date)

a. Create the above tables by properly specifying the primary key
b. Enter At least five tuples for each relation.
c. Execute the following queries
   1. List the item no, unit price, quantity and total price for a particular order no.

2. List the customer name, city, order number and order amount for a particular customer.

Database **3**: STUDENTS, COURSES & BOOK ISSUED

Consider the following relations for Student, courses & Book issued database.

STUDENT	(Regno:String, Name:String; Major:String; Bdate:Date)
COURSE	(Courseno:Integer, Cname:String; Dept:String)
ENROLL	(Regno:String; Courseno;integer; Semester:Integer: Marks:int)
BOOKADOPTION	(Courseno:Integer ;Semester:Integer;BookISBN:Int)
TEXT	(BookISBN:Int; BookTitle:String;Publisher:String;Author:string)

a. Create the above tables by properly specifying the primary key.
b. Enter At least five tuples for each relation.
c. Demonstrate how to add new text book to the database and make this book be adopted bysome course
d. Execute the following queries
1. Produce a list of textbooks with Book ISBN, Title, publisher, author, course name and course number adopted by some course.
2. List the name, major, course name, semester and the marks obtained by a particular student.

Database **4**: BOOK DEALER

Consider the following relations for a database application for a Book Dealer

AUTHOR	(Authorid int, Name:String, City:String,Country:String)
PUBLISHER	(Publisherid:int, Name:String, City:String, Country:String)
CATALOG	(Bookid:int, Title:String, Authorid int, Publisherid:int, Categoryid: int,Year:int, Price:int)
CATEGORY	(Categoryid: int, Description:String)
ORDERDETAIL	(Oredrno:int, Bookid:int, Quantity:int)

a. Create the above tables by properly specifying the primary key.
b. Enter At least five tuples for each relation.
c. Execute the following queries
1 . Demonstrate how to increase the price of the book published by a specific publisher by 10%.
2. Display the title of the book having maximum sales.

Database **5**: BANK

Consider the following relations for a Bank database application

BRANCH	(BranchID: integer, Branchname: String, Branchcity:String, Assets:Real)
ACCOUNT	(Accno:Int, BranchID:Integer, Balance:Real)
CUSTOMER	(AccountNo: Integer,Customername:String, CustomerCity:String)
LOAN	(Loano:Integer, BranchID : Integer, Amount:Real)
BRROWER	(AccountNo: Integer, Loano:Integer)

a. Create the above tables by properly specifying the primary key
b. Enter At least five tuples for each relation.
c. Execute the following queries:
1. List the names of the customers with their Loan Amount who have taken loan from the main branch(in any city)

2. Find all the customers who have accounts at the main branch.

Note: At least FIVE Databases with at least FIVE tables including Queries should be done by each student.

Distribution of Marks:

Assessment Criteria	Marks
Creating the tables each table 5 marks: 5 x 5	25
Executing the queries	05
Viva Voice on DBMS	05
Journal	05
Total	**40**

Discipline Specific Elective (DSE) under CBCS

B.Sc. Semester - V

COMPUTER SCIENCE: Paper-II (CST: P-II E)

(Candidate shall choose either Paper-I or Paper-II)

HTML and XML Programming

Credits	**I. Theory**	**: 04**	**Theory class 4Hours / week. Total theory: 60Lectures** **80 Marks for Semester End Examination (3 Hours) & 20 marks IA**
	II. Practical	**: 02**	**Practical: 4 Hours / week Total Practical: 52 Hours.** **40 marks for Semester End Examination (3 Hours) & 10 marks IA**
	Total Credits	**: 06**	**Total Theory marks 100 and Practical marks 50**

Unit I: **12 Hours**

Introduction to HTML, What is HTML and Where did it come from?, HTML Syntax, Semantic Markup, Structure of HTML Documents, Quick Tour of HTML Elements, HTML5 Semantic Structure Elements, Introduction to CSS,What is CSS, CSS Syntax, Location of Styles, Selectors, The Cascade: How Styles Interact, The Box Model, CSS Text Styling.

Unit II: **12 Hours**

HTML Tables and Forms, Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, Table and Form Accessibility, Microformats, Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks.

Unit III: **12 Hours**

Introduction to XML - Some current applications of XML, Features of XML, Anatomy of XML document, The XML Declaration, Element Tags- Nesting

and structure, XML text and text formatting element, Table element, Mark-up Element and Attributes, Document Type Definition (DTD), types.

Unit IV: **12 Hours**

XML Objects, Checking Validity, Understanding XLinks, XPointer, Event-driven Programming, XML Scripting. XML Presentation Technology- Introduction, XML with Style Sheet Technologies- Concept of XSL, XML Schema, Importance of XML schema, Creating Element in XML Schema, XML Schema Types.

Unit V: **12 Hours**

XML Processor- Introduction of XML Processor- Components of XML processor, Concept of DOM and SAX, Introduction of Java Script, JavaScript characteristics, Objects in Java Script, Dynamic HTML with Java Script

Text Books:

2. Randy Connolly, Ricardo Hoar, **"Fundamentals of Web Development",** 1stEdition, Pearson Education India.

Reference Books:

6. Robin Nixon, "Learning PHP, MySQL &JavaScript with jQuery, CSS and HTML5", 4thEdition, O'Reilly Publications, 2015. (ISBN:978-9352130153).
7. Luke Welling, Laura Thomson, "PHP and MySQL Web Development", 5th Edition.Pearson Education, 2016. (ISBN:978-9332582736).
8. Nicholas C Zakas, "Professional JavaScript for Web Developers", 3rd Edition, Wrox/Wiley India, 2012. (ISBN:978-8126535088).
9. David Sawyer Mcfarland, "JavaScript & jQuery: The Missing Manual", 1st Edition, O'Reilly/Shroff Publishers & Distributors Pvt Ltd, 2014 (ISBN:978-9351108078)
10. Joe Fawcett, Danny Ayers, Liam R. E. Quin "Beginning XML", 5th Edition ISBN: 978-1-118-16213-2
11. Erik T. Ray "Learning XML" Publisher(s): O'Reilly Media, Inc., ISBN: 9780596000462

Sample Programs:

1. Create a HTML program to illustrate radio buttons.
2. Create a HTML program to display the details of any four companies with the attributes like, name, product, CEO and Indian or MNC
3. Create a HTML program to display nested list of 5 favorite Cricketers, countries and matches they play , using hyperlinks
4. Create a HTML program to display multiple documents at the same time.
5. Create a HTML including CSS program for illustrating the different font properties and margins.
6. Create a HTML including CSS program to illustrate the border style properties for tables.
7. Write a JavaScript program for finding maximum of 3 numbers using built-in Math function.
8. Write a JavaScript program to change the color of the text.
9. Write a JavaScript program to validate the name and password entered by the user.
10. Write a JavaScript program to move an image across the screen.
11. Create a simple XML document to display the address book.
12. Create a xml document and database for importing and exporting xml document into database.

13. Create a XML program for Internal DTD(Document Type Definition) creation.
14. Create a XML program for External DTD(Document Type Definition) creation
15. Create a parsing XML document using DOM(Document Object Model) parser.

Distribution of marks:

Overview, Basic tags, Elements, Attributes, Formatting,		Marks
Program – 1	Writing the Program	07
	Execution	08
Program -2	Writing the Program	07
	Execution	08
Viva Voice based HTML & XML		05
Journal		05
Total		**40**

Discipline Specific Elective (DSE) under CBCS

B.Sc. Semester - VI

COMPUTER SCIENCE: Paper-I (CST: P-I F)

(Candidate shall choose either Paper-I or Paper-II)

Programming with Java

Credits	**I. Theory**	**: 04**	**Theory class 4Hours / week. Total theory: 60Lectures** **80 Marks for Semester End Examination (3 Hours) & 20 marks IA**
	II. Practical	**: 02**	**Practical: 4 Hours / week Total Practical: 52 Hours.** **40 marks for Semester End Examination (3 Hours) & 10 marks IA**
	Total Credits	**: 06**	**Total Theory marks 100 and Practical marks 50**

Unit I: **12 Hours**

Introduction to Java: History, Features, Java Development Kit (JDK), Comparison of C, C++ and Java, Structure of Java Program, Sample programs with output statement and Command line Arguments, Implementing a java program, Java Virtual Machine (JVM).

Unit II: **12 Hours**

Classes and Methods: Defining a Class in Java, defining data members and methods, Visibility modes with access specifiers, Creating Objects, Accessing Class members, Constructors, Methods Overloading.Inheritance: Extending a class, Overriding methods, Abstract methods and Classes. Pure virtual functions. Examples of Java application programs based on the concepts: constructors, inheritance and polymorphism.

Unit III: **12 Hours**

Arrays, Strings and Vectors: Arrays, One-dimensional Arrays, Creating an Array, Two-Dimensional Arrays, Strings, String methods, String Buffer class, Vectors, Vector methods, Wrapper Classes.

Interfaces and Packages & Threads: Interfaces, Multiple Inheritance: Defining Interfaces, Extending interfaces, implementing interfaces, Accessing interface variables. **Java Packages**: Introduction to Package, Types of Packages- System & User Defined- defining and implementing packages.

Unit IV: **12 Hours**

Multithreading: State Transition Diagram of Thread, Life Cycle of Thread. Exception Handling: try and catch blocks, Keywords: THIS, SUPER, FINALLY,

Applets: Difference between Applets and Applications, Preparing to write Applets, Building Applet code, Applet Life Cycle, Creating an executable applet, Designing a web page, Applet Tag, Adding applet to HTML file, running the applet, Passing parameters to Applets, Aligning the display, Displaying Numerical Values, Getting Input from the User.

Unit V: **12 Hours**

Event Handling: Events, Event Handling Mechanisms, Events Sources, Event Listeners, Event Classes: Action Event Class, Item Event Class, Event Listener Interfaces: Action Listener Interface, Item Listener Interface, Examples of Key Event Class, Mouse Event Class, Key Listener Interface, Mouse Listener Interface, Mouse Motion Listener Interface.

Text books:

1. E. Balgurusamy : Programming with Java(TMH)

Reference Books:

1. Shielt : Complete Reference JAVA (TMH)
2. Patrik Baughton : The JAVA Handbook (TMH)

COMPUTER SCIENCE LAB: CSPr: E

Paper –I: Programming with Java

Write Java Application Programs for the following:

1. Find the factorial of N numbers using command line argument.
2. Display the N Prime numbers using command line argument.
3. Demonstrate String Operations.
4. Demonstrate Multithreading.
5. Demonstrate Exception Handling.
6. Demonstrate user defined package program.
7. Demonstrate Method overloading.
8. Demonstrate Constructor overloading.

Write Java Applet Programs for the following:

9. Display Geometrical Figures using objects.
10. Display a human face.
11. Illustrate Scroll bar object.
12. Change the background color of the applet randomly.
13. Display *Hello World* and change the foreground color randomly.
14. Implement Digital Clock.
15. Implement Mouse event.

Distribution of Marks:

Assessment Criteria		Marks
Program – 1	Writing the Program	07

	Execution	08
Program -2	Writing the Program	07
	Execution	08
Viva Voice based on Java		05
Journal		05
Total		**40**

Discipline Specific Elective (DSE) under CBCS

B.Sc. Semester - VI

COMPUTER SCIENCE: Paper-II (CST:P-II F)

(Candidate shall choose either Paper-I or Paper-II)

Introduction to Computer Graphics

			Theory class 4Hours / week. Total theory: 60Lectures
	I. Theory	**: 04**	**80 Marks for Semester End Examination (3 Hours) & 20 marks IA**
Credits			**Practical: 4 Hours / week Total Practical: 52 Hours.**
	II. Practical	**: 02**	**40 marks for Semester End Examination (3 Hours) & 10 marks IA**
	Total Credits	**: 06**	**Total Theory marks 100 and Practical marks 50**

Unit I: 12 Hours

Graphics system: Introduction of Computer Graphics, Applications of CG. Video Display Devices: Cathode-Ray Tube, Raster-Scan Displays, Random-Scan Displays, Color CRT monitors, Flat-Panel Displays. Three-Dimensional viewing Devices. Raster-Scan Systems and Random-Scan Systems. Hard copy devices, input devices, Graphic software

Unit II: 12 Hours

Output Primitives: Points and lines, Line drawing algorithm: Digital Differential Analyzer (DDA), Bresenham's line algorithms, Circle generating algorithms. Ellipses (Example Problems). Attributes of output primitives: Line type, Line Width, Line color, Area filling, scan line algorithm**.**

Unit III: 12 Hours

Two dimensional transformations: Basic transformation: translation, scaling and Rotation. Matrix representation and homogeneous co-ordinates, composite transformation: translation, scaling and rotations. Other Transformations. Transformations Between Coordinate Systems. Roster methods for transformation. **Two-Dimensional Viewing and clipping:** The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-To-Viewport Coordinate Transformation. Clipping algorithms: line clipping, area clipping, Polygon clipping.

Unit IV: 12 Hours

Interactive Input Methods: Physical input devices: Keyboard, touchpanels, lightpen, Graphics tablets, joysticks, mouse, trackball, interactive picture construction techniques.
Three Dimensional concepts: Three-dimensional co-ordinate systems, three-dimensional display techniques, perspective and parallel projections, polygon surfaces, curved surfaces, Quadric Surfaces, Bazier Curves and Surfaces octrees.

Unit V: **12 Hours**

Segments: Introduction, Segment Table, Function of Segmenting the Display File, More about segments, Image Transformation, Raster Techniques, Animation using Segments.

Text books:

5. Donald Hearn & M. Pauline Baker, Computer Graphics C Version, Pearson education/PHI.
6. Computer Graphics-Steven Harrington, McGH

Reference books:

7. Principles of Interactive Computer Graphics-Newman and Sproull, McGraw Hill
8. Graphics Under C-Yeshwant Kanetkar, BPB publications.
9. James D foley, Adries Van Dam, Steven K Feiner, John F Hughes, Computer Graphics, Addison Wesley,1997.

COMPUTER SCIENCE LAB: CSPr-F
Paper– II: Computer Graphics

Sample exercises: Write 'C' programs for the following:

1. Create a chess board
2. Implement bar() function
3. Draw a circle
4. Draw a rectangle
5. Draw ellipse
6. Draw various shapes
7. Move a car
8. Create Smiling face animation
9. Draw a pie chart
10. Illustrate captcha concept
11. Display circles in circles
12. Demonstrate countdown
13. Demonstrate traffic light program
14. Restrict mouse pointer in a circle
15. Create a rainbow

Distribution of marks:

Assessment Criteria		Marks
Program – 1	Writing the Program	07
	Execution	08
Program -2	Writing the Program	07
	Execution	08
Viva Voice based on Computer Graphics		05
Journal		05
Total		**40**

GENERAL PATTERN OF THEORY QUESTION PAPER FOR ALL THE SEMESTERS

1. **Question number 1-12 carries 2marks to answer any 10 questions : 20 marks**
2. **Question number 13-21 carries 5marks to answer any 6 questions : 30 marks**
3. **Question number 22-26 carries 10marks to answer any 3 questions : <u>30 marks</u>**

(10 marks questions may be 6+4 or 7+3 or 10) Total: 80 marks

SKILL ENHANCEMENT COURSES (SEC) in Computer Science

B.Sc. Semester -V

COMPUTER SCIENCE: SEC- I (SEC-CS- 1E)

Total Syllabus: 30 Hours / Semester: 2 Hours / Week

Examination: Maximum Marks- 50 (40 Semester End exam + 10 IA Exam)

Duration of Exam: 1.5 Hours

ARTIFICIAL INTELLIGENCE

Unit I: **10 Hours**

Introduction: What is AI? Intelligent Agents: Agents and Environment; Rationality; the Nature of Environment; the Structure of Agents. Problem solving: Problem-Solving Agents; Example Problems; Searching for Solution; Uninformed Search Strategies.

Unit III: **10 Hours**

Informed Search, Exploration, Constraint Satisfaction, Adversial Search: Informed Search Strategies; Heuristic functions; On-line Search agents and Unknown environment. Constraint satisfaction problems; Backtracking search for CSPs. Adversial search: Games; Optimal decisions in games; Alpha-Beta pruning.

Unit III: **10 Hours**

Logical Agents: Knowledge-based agents; The wumpus world as an example world; Logic; propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic.

Text Books:

3. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, 2nd Edition, Pearson Education, 2003

Reference Books:

5. Elaine Rich, Kevin Knight: Artificial Intelligence, 3rd Edition, Tata McGraw Hill, 2009.
6. Nils J. Nilsson: Principles of Artificial Intelligence, Elsevier, 1980.

SKILL ENHANCEMENT COURSES (SEC) in Computer Science

B.Sc. Semester -V

COMPUTER SCIENCE: SEC- 2 (SEC-CS- 2E)

Total Syllabus: 30 Hours / Semester: 2 Hours / Week

Examination: Maximum Marks- 50 (40 Semester End exam + 10 IA Exam)

Duration of Exam: 1.5 Hours

DATA MINING

Unit I: **10 Hours**

Introduction: Data Mining: Introduction, What is data mining, Data Mining Definitions, KDD Vs Data Mining, DBMS Vs Data Mining, Other related areas, DM techniques, Other Mining Problems, Issues and Challenges in DM, DM application areas, DM applications. Data Warehouse: Introduction, What is Data Warehouse, Definition, Multidimensional Data Model, OLAP operations, Warehouse Schema, Data Warehouse Architecture, Warehouse Server, Meta Data, Data Warehouse backend process.

Unit II: **10 Hours**

Association Rules: Introduction, Association Rule, Methods to discover association rules, a priori algorithm, partition algorithm, pincer-search algorithm(only concept p-84), Decision Trees :Introduction, Decision Tree, Tree Construction Principle, Best Split, Splitting Indices (only definitions of Entropy, (p-169,170),Decision Tree Construction Algorithms, CART, ID3.

Unit III: **10 Hours**

Rough Set Theory : Introduction, Definition(up to -Rough Set p- 210,211), Rough Sets and Fuzzy Sets (concept, definition of rough set member function-p226), Other Techniques :Introduction, Neural Network, Learning in NN, Unsupervised Learning, Genetic Algorithm, Support Vector Machines (concept p-250,251).

Text Books:

5. Arun K. Pujari, Data Mining Techniques, , Universities Press India, 4th Edition 2016
6. Han, Jiawei and Kamber, Michelin, Data Mining: Concepts and Techniques. Morgan Kaufman Publishers, 2012.

Reference Books :

7. M Ramakrishna Murthy, Introduction to Data Mining and Soft Computing Techniques, Laxmi Publications Pvt Ltd, 2017.

8. Paul Teetor, R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics, O'reilly Cookbooks, 2011
9. Margaret H. Dunhan: Data mining-Introductory and Advanced Topics, Pearson Education.

SKILL ENHANCEMENT COURSES (SEC) in Computer Science

B.Sc. Semester -VI

COMPUTER SCIENCE: SEC- 3 (SEC-CS- 1F)

Total Syllabus: 30 Hours / Semester: 2 Hours / Week

Examination: Maximum Marks- 50 (40 Semester End exam + 10 IA Exam)

Duration of Exam: 1.5 Hours

MOBILE COMMUNICATIONS

Unit I: **10 Hours**

Cellular Concept: Frequency Reuse, Channel Assignment Strategies, Interference and System Capacity, Power Control for Reducing Interference, Trunking and Grade of Service, Improving Capacity in Cellular Systems.

Mobile Radio Propagation: Large Scale path Loss- Free Space Model, Three basic propagation mechanisms, Practical Link Budget Design using Path Loss Models, Outdoor Propagation Models – Okumura, Hata, PCS Extension to Hata Model (explanations only).

Unit II: **10 Hours**

Mobile Radio Propagation: Small-Scale Fading and Multipath: Small scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions, Statistical Model for Multipath Fading Channels (Clarke's Model for Flat Fading only).

Unit III: **10 Hours**

System Architecture and Addressing: System architecture, The SIM concept, Addressing, Registers and subscriber data, Location registers (HLR and VLR) Security-related registers (AUC and EIR), Subscriber data, Network interfaces and configurations.

Air Interface – GSM Physical Layer: Logical channels, Physical channels, Synchronization-Frequency and clock synchronization, Adaptive frame synchronization, Mapping of logical onto physical channels, Radio subsystem link control, Channel coding, source coding and speech processing, Source coding and speech processing, Channel coding, Power-up scenario.

GSM Protocols: Protocol architecture planes, Protocol architecture of the user plane, Protocol architecture of the signaling plane, Signaling at the air interface (Um), Signaling at the A and Abis interfaces, Security-related network functions, Signaling at the user interface.

CDMA Technology : Introduction to CDMA, CDMA frequency bands, CDMA Network and System Architecture, CDMA Channel concept, Forward Logical Channels, Reverse logical Channels, CDMA frame format

Text Books:

7. Theodore Rapport, ―Wireless Communications – Principles and Practice‖, Prentice Hall of India , 2nd Edition, 2007, ISBN 978-8-120-32381-0.
8. Jorg Eberspacher, Hans-Jorg Vogel, Christian Bettstetter, Christian Hartmann, "GSM– Architecture, Protocols and Services‖, Wiley,3rd Edition, 2009,ISBN-978- 0-470-03070-7.

9. Gary J Mullet, —Introduction To Wireless Telecommunications Systems and Networks", Cengage Learning

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SKILL ENHANCEMENT COURSES (SEC) in Computer Science

B.Sc. Semester -VI

COMPUTER SCIENCE: SEC- 4 (SEC-CS- 2F)

Total Syllabus: 30 Hours / Semester: 2 Hours / Week

Examination: Maximum Marks- 50 (40 Semester End exam + 10 IA Exam)
Duration of Exam: 1.5 Hours

CYBER SECURITY

Unit I: **10 Hours**

Introduction: Cyber Attacks, Defence Strategies and Techniques, Guiding Principles, Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Comma Divisor, Useful Algebraic Structures, Chinese Remainder Theorem, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography – Product Ciphers, DES Construction.

Unit II: **10 Hours**

Public Key Cryptography and RSA: RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack, Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange, Other Applications.

Unit III: **10 Hours**

Key Management: Introduction, Digital Certificates, Public Key Infrastructure, Identity–based Encryption, Authentication–I - One way Authentication, Mutual Authentication, Dictionary Attacks, Authentication – II – Centalised Authentication, The Needham-Schroeder Protocol, Kerberos, Biometrics, IPSecSecurity at the Network Layer – Security at Different layers: Pros and Cons, IPSec in Action, Internet Key Exchange (IKE) Protocol, Security Policy and IPSEC, Virtual Private Networks, Security at the Transport Layer - Introduction, SSL Handshake Protocol, SSL Record Layer Protocol, OpenSSL.

Text Books:

3. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition

Reference Books:

9. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-GrawHill, 3rd Edition, 2015.
10. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition.
11. Cyber Law simplified- Vivek Sood, Mc-GrawHill, 11th reprint , 2013.
12. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindra kumar, Cengage learning.

GENERAL PATTERN OF THEORY QUESTION PAPER FOR ALL SEC PAPERS

1. **Question number 1-6 carries 2marks to answer any 5 questions : 10 marks**
2. **Question number 7-14 carries 4marks to answer any 5 questions : 20 marks**
3. **Question number 15-17 carries 5marks to answer any 2 questions : 10marks**

Total: 40 marks

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