Choice Based Credit System (CBCS)

Gangadhar Meher University
SAMBALPUR, ODISHA

Proposed syllabus and Scheme of Examination

For B. Sc. IST (Honours)
(Information Science & Telecommunication)

UNDERGRADUATE PROGRAMME IN B. Sc. IST
(Courses effective from Academic Year 2020-21)

SYLLABUS OF COURSES TO BE OFFERED
Core Courses, Elective Courses & Ability Enhancement Courses

Department of B. Sc. IST
(Information Science & Telecommunication)
Gangadhar Meher University
SAMBALPUR, ODISHA

REGULATIONS OF GENERAL ACADEMIC AND EXAMINATION MATTERS FOR BA/B.Sc./B.COM/BBA/BSc.IST EXAMINATIONS

(THREE YEAR DEGREE COURSE) UNDER CHOICE BASED CREDIT SYSTEM AND SEMESTER SYSTEM

(Effective for the students admitted to First year of Degree course during 2019-20 and afterwards)

CHAPTER-I
(REGULATIONS OF GENERAL ACADEMIC MATTERS)

1. APPLICATION & COMMENCEMENT:

(i)   These regulations shall come into force with effect from the academic session 2019-20.

2. CHOICE-BASED CREDIT SYSTEM (CBCS):

CBCS is a flexible system of learning that permits students to

1. Learn at their own pace.

2. Choose electives from a wide range of elective courses offered by the University Departments.

3. Adopt an inter-disciplinary approach in learning and

4. Make best use of the expertise of available faculty.

3. SEMESTER:

Depending upon its duration, each academic year will be divided into two semesters of 6 months duration. Semesters will be known as either odd semester or even semester. The semester from July to December will be Semesters I, III, V and similarly the Semester from January to June will be Semesters II, IV & VI. A semester shall have minimum of 90 instructional days excluding examination days / Sundays / holidays etc.

4. COURSE:

A Course is a set of instructions pertaining to a pre-determined contents (syllabus), delivery mechanism and learning objectives. Every course offered will have three components associated with the teaching-learning process of the course, namely:

(i)   Lecture – symbolized as L;

(ii)   Tutorial – symbolized as T; and

(iii)   Practical – symbolized as P.

In G.M. University, UG programmes have a minimum of 21 courses.

5. CREDIT:

Each course is rated in terms of credits or credit hours. Credit is a kind of weightage given to the contact hours to teach the prescribed syllabus, which is in a modular form. Normally one credit is allocated to 10 contact hours.

Mechanics of credit calculation:

As per G.M. University standard, 1 credit = 10 hours of lectures / contact hours. The contact hours will include all the modes of teaching like lectures / tutorials / laboratory work / field work or other forms. In determining the number of hours of instruction required for a course involving laboratory / field work, 2 hours of laboratory / field work is generally considered equivalent to 1 hour of lecture. In these regulations one credit means one hour of teaching works or two hours of practical works per week.

6. GRADE LETTER:

The Grade letter is an index to indicate the performance of a student in a particular course /

paper. It is the transformation of actual marks secured by a student in a course / paper. The Grade letters are O, A+, A, B+, B, C, P, F. There is a range of marks for each grade letter.

7. GRADE POINT:

Grade point is an integer indicating the numerical equivalent of the letter grade / the weightage allotted to each grade letter depending on range of marks awarded in a course / paper.

8. CREDIT POINT (P):

Credit point is the value obtained by multiplying in grade point (G) by the credit (C): P = G x C.

9. SEMESTER GRADE POINT AVERAGE (SGPA):

SGPA is the value obtained by dividing the sum of credit points (P) earned by a student in various courses taken in a semester by the total number of credits earned by the student in that semester. SGPA shall be rounded off to two decimal places.

10. CUMULATIVE GRADE POINT AVERAGE (CGPA):

CGPA is the value obtained by dividing the sum of credit points in all the courses earned by a student for the entire programme, by the total number of credits. CGPA shall be rounded off to two decimal places. CGPA indicates the comprehensive academic performance of a student in a programme.

An overall letter grade (Cumulative Grade) for the entire programme shall be awarded to a student depending on his / her CGPA.

11. COURSE STRUCTURE:

(a) **COURSE:** A course is a component / a paper of a programme. A course may be designed to involve lectures / tutorials / laboratory work / seminar / project work / practical training / report writing / viva voce etc. or a combination of these, to meet effectively the teaching and learning needs and the credits may be assigned suitably.

(b) **TYPES OF COURSES:**

(i) Core Courses (14x6=84 credits)

Core courses comprise a set of at least fourteen papers that are identified as compulsory for the students registered for the UG degree in a particular subject. Core courses shall be spread over all the semesters.

(ii) Ability Enhancement Compulsory Course (04 credits)

The Ability Enhancement Course (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement; i. Environmental Science and ii. English / MIL Communication. These are mandatory for all disciplines.

(iii) Skill Enhancement Course (SEC) (04 credits)

SEC courses are value-based and / or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. These courses may be chosen from a pool of courses designed to provide value-based and / or skill-based knowledge.

(iv) Elective Courses: 48 credits (24+24)

Elective Course: A course that can be chosen from a number of options other than the core and compulsory courses is known as elective course. An elective may be "Generic Elective" focusing on those courses which add generic proficiency to the student. An elective may be "Discipline Centric" or may be chosen from the main discipline / subject of study called Discipline Specific Elective. Such elective may also include project work / dissertation. It is considered as a special course involving the application of knowledge in solving / analyzing / exploring a real life situation / difficult problem.

The Three year Degree course leading to the Bachelors Degree in Arts/Science/Commerce/BBA/BSc.IST shall be spread over a period of six semesters in three academic years with the following course structure.

Semester	Core Course (6 credits per paper)	Ability Enhancement Compulsory Course (2 credits per paper)	Skill Enhancement Course (2 credits per paper)	Discipline Specific Elective (6 credits per paper)	Generic Elective (6 credits per paper)
I (350 Marks)	CC-I CC-II (EC)	AECC-I	-	-	GE-I (DE)
II (350 Marks)	CC-III CC-IV (CSA)	AECC-II	-	-	GE-II
III (450 Marks)	CC-V CC-VI CC-VII	-	SEC-I	-	GE-III
IV (450 Marks)	CC-VIII CC-IX CC-X	-	SEC-II (Python)	-	GE-IV
V (400 Marks)	CC-XI CC-XII	-	-	**DSE-I DSE -II**	-
VI (400 Marks)	CC-XIII	-	-	DSE -III	-
	CC-XIV			DSE -IV Project Work/ Dissertation	

CHAPTER – II
(REGULATION ON EXAMINATION MATTERS)

1. The Examinations

1.1.(a)   A candidate for the Bachelor's Degree in Arts/Science/Commerce/BBA/BSc.IST shall be required to pass each of the following examinations.

(i)	Semester-I	(ii)	Semester-II
(iii)	Semester-III	(iv)	Semester-IV
(v)	Semester-V	(vi)	Semester-VI

Each of the semester examination includes one Mid-Term and one End Term examination.

1.1.(b)   Each student has to register himself / herself within schedule date to be eligible to appear the examination. Unless a student registers himself / herself by filling up examination forms and pays the requisite fees for Semester-I, he/she will not be eligible to sit for semester-II examination. Similarly, he/she will not be eligible to take the subsequent semesters unless he/she registers for the previous semester.

1.1.(c)   A student has to clear all semester examinations within a maximum period of 05 years.

1.2   Examination Calendar

The broad format of the examination calendar for UG classes shall be as follows:

(a)	Mid term examination of odd semesters	…	September
(b)	End Term examination of odd semesters	…	November – December
(c)	Mid term examination of even Semesters	…	February
(d)	End Term examination of even semesters	…	March – April

The detail programme of end term examination shall be notified one month before the commencement of examinations.

1.3.   Mid Term examination

In each semester there shall be one Mid Term examination of one hour / 60 minutes duration irrespective of marks in each paper having theory component. Out of the total marks of a paper, 20% of marks are earmarked for midterm examination.

1.4   End Term Examination

At the end of each semester, there shall be one examination of each paper called End Term examination. It shall cover 80% of the total marks of a paper. A student fulfilling the following conditions is eligible to appear the End Term examination.

i. A student shall pay the prescribed examination fees and fill up the prescribed form meant for the examination as per the notification issued by Examination Section (General). No form fill up is allowed before seven days of the commencement of the End-Term examination.

ii. The minimum number of lectures, practicals, seminars, which a student shall be required to attend before being eligible to take any Semester Examination shall not be less than 75% of the total number of lectures, practicals, seminars taken separately during the semester period.

iii. Provided that in exceptional cases the authority may condone the shortage of attendance to the extent of 15%.

iv. Provided further that the authority may condone the shortage of attendance to the extent of 10% over and above 15% in respect of students who represented the college or the state in any National / State Level: Camp, NCC, games or sports during the semester period under reference subject to prior approval and subsequent production of authenticated certificate of participation.

1.5.(a)   Mode of Examination

The duration of examination shall be as follows:

Examination	Total marks	Duration
Theory paper	40 Marks	2 hours
	60/80 Marks	3 hours
Practical papers / Project Papers	25 Marks	3 hours
	50/100 marks	6 hours

1.5.(b)   Mode of question papers

(i)   All examinations except Viva-voce and Project work shall be conducted by means of written paper (Printed, written / typed in English). The papers in Modern Indian Languages shall be set and answered in the respective languages as mentioned in the syllabus.

(ii)   Questions for a paper shall be set covering the total course of that paper either unit wise giving options from each unit unless specified otherwise in the syllabus.

1.5 (c)   Results of examinations

The candidates shall have to appear and secure minimum pass grade in all the paper of a semester examination to be declared as pass. The following 10 – point grading system and corresponding letter grades be implemented in awarding grades and CGPA under CBCS system.

1.6   Award of Grade

The grade awarded to the student in any particular course / paper shall be based on his / her performance in all the tests conducted in a semester for that course / paper. The percentage of marks secured by the students in a particular course / paper shall be converted to a grade and grade point for that course / paper in the manner specified in the following table after conversion in to 100 marks.

% of Marks	Grade	Grade Letter	Grade Point
> = 90 – 100	Outstanding	O	10.0
> = 80 – < 90	Excellent	A+	9.0
> = 70 – < 80	Very good	A	8.0
> = 60 – < 70	Good	B+	7.0
> = 50 – < 60	Above average	B	6.0
> = 40 – < 50	Average	C	5.0
> = 30 – < 40	Pass	P	4.0
< 30	Fail	F	0.0
	Absent	S	0.0
	Malpractice	M	0.0

N.B.: Grade 'P' (30% of marks) shall be the pass grade for Theory and Grade 'C' (40% of marks) shall be the pass grade for Practical / Project work / Dissertation.

1.7 Result

1.7(a) In order to pass a course / paper, a candidate has to secure a minimum of Grade Point 4.0 in that course / paper with Grade 'P' (30% of marks) in Theory and Grade 'C' (40% of marks) in Practical / Project work / Dissertation failing which the candidate will be marked 'F' in that course / paper with the Grade Point of 0.0 (below 30 marks) irrespective of the marks secured in that course / paper.

A candidate obtaining Grade 'F' shall be considered as fail and will be required to reappear the course(s) / paper(s) as back paper. The back paper examination shall be held with the normal end semester examination and the students with backlogs shall clear their backlog course(s) / paper(s) along with regular students of lower semesters in the subsequent year within a period of 05 years from the date of admission and with the current syllabus after two consecutive chances.

1.7(b) In order to clear a semester examination, a candidate is required to pass each credit course / paper of that semester and must secure a minimum Semester Grade Point Average (SGPA) of 4.0. The semester result shall be indicated as detail below:-

A. P (Passed or Cleared) indicating that:

- The candidate has cleared every registered course / paper of odd/even semester of the academic year with a minimum Grade Point (GP) of 4.0 in each paper / component of a paper.

    He / She has secured SGPA / CGPA of 4.0 or more.

B. NC (Not Cleared) indicating that:

The candidate is eligible for promotion with backlogs to next higher semester if he / she has registered for all the subjects of any semester.

C. 'X' (Not eligible for promotion) indicating that:

The candidate is not eligible for promotion to next higher level, when as he /

she has not registered / filled up the form for the different subjects of a semester.

Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

SGPA (Si) = $\sum(C_i X G_i)/\sum C_i$

Where C_i is the number of credits of i th course and G_i is the grade point scored by the student in the i th course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

CGPA = $\sum(C_i x S_i)/\sum C_i$

Where S_i is the SGPA of the Ist. semester and C_i the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

i. Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade letter	Grade point	Credit point
Course 1	3	A	8	3X8=24
Course 2	4	B+	7	4X7=28
Course 3	3	B	6	3X6=18
Course 4	3	O	10	3X10=30
Course 5	3	C	5	3X5=15
Course 6	4	B	6	4X6 =24
	20			139

Thus, SGPA = 139/20=6.95

Illustration for CGPA					
Semester-I	**Semester-II**	**Semester-III**	**Semester-IV**	**Semester-V**	**Semester-VI**
Credit-20 SGPA:6.9	Credit-22 SGPA:7.8	Credit-25 SGPA:5.6	Credit-26 SGPA:6.0	Credit-26 SGPA:6.3	Credit-25 SGPA:8.0

Thus, CGPA= $\dfrac{20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0}{144}$	=6.73

1.7(c) In Order To Pass A Programme, A Candidate Must Secure A Minimum Cgpa Of 4.5. A Candidate Securing Cgpa Of Less Than 4.5 Shall Be Declared As Fail.

In Order To Retain Honours, A Student Has To Secured 'C' Grade And Above In Cgpa After Completion Of 6th Semester.

In Order To Obtain Distinction, a student has to secure a minimum of 'B' Grade and above CGPA after completion of 6th Semester in first chance i.e. without any back or improvement.

The conversion of CGPA to percentage of marks = (CGPA – 0.5) x 10.

The conversion of CGPA into Grade Letter and classification of Honoursshall be made on the basis of percentage of marks in the manner specified in the following table.

CGPA / OGPA	Grade Letter	Grade	% of Marks after conversion	Classification of Honours
$> = 9.5$	O	Outstanding	$> = 90$	First Class Honours
$> = 8.5 - < 9.5$	A+	Excellent	$> = 80 - < 90$	
$> = 7.5 - < 8.5$	A	Very good	$> = 70 - < 80$	
$> = 6.5 - < 7.5$	B+	Good	$> = 60 - < 70$	
$> = 5.5 - < 6.5$	B	Above average	$> = 50 - < 60$	Second Class Honours
$> = 5.0 - < 5.5$	C	Average	$> = 45 - < 50$	
$> = 4.5 - < 5.0$	P	Pass	$> = 40 - < 45$	Pass without Honours
Below 4.5	F	Fail	< 40	Fail

1.8   Promotion to the next semester

A student shall be promoted to the next higher semester when he/she has appeared and passed in all the courses of the previous semester examinations. However, a student failing to appear / pass semester examination in few or all papers due to some reasons may be admitted to the next semester, provided that such a student shall produce sufficient proof in favour of his/her reason for not being able to appear / pass in some or all papers of the semester examination and has taken readmission in the year. Such students shall be considered as absent /

failed candidate and will required to appear the repeat / back paper examination in the next year.

1.9   **Repeat / Back Paper Examination**

A student who remains absent or failed to secure 30% of marks / SGPA of 4.0 in aggregate has to take the repeat examination. He/she shall repeat all the theory and practical papers of that semester within a period of 5 years from the date of first registration. However, a student who secures more than 30% of marks / SGPA of 4.0 in aggregate but failed in one / some papers, he/she has to take the Back paper examination in the failed papers only. If the student is unable to clear the back papers in the next two consecutive chances, he/she has to appear the repeat examination of all papers in the third and subsequent chances as per the current syllabus and the marks secured in the previous examinations shall stand cancelled.

During back paper examinations, the higher marks of the papers shall be retained at the time of computation of result. The student passing in all papers in terms of grade point but failing in grade point average, then he / she has to appear the back paper examinations in those papers in which he / she has secured less than the required average grade point to pass. Such students shall have to apply to the Head of the Department in plain paper before one week of the form fill up and also filling the form in due date of the ensuing semester examination by depositing the fees as prescribed by the university. The repeat / back paper examination shall be held with the normal end semester examination.

A student appearing in repeat / back paper examination shall not be awarded distinction even if he/she subsequently fulfils the conditions of distinction and will not be included in the merit list. The final result of the candidate will be determined after taking all the subject wise marks and hard case rule into consideration. Candidates taking repeat / improvement examinations shall not be considered for the merit list and it shall be reflected in the provisional certificate- cum mark sheet but not in the final Degree certificate.

1.10   **Improvement Examination**

After the publication of final result the student getting 2nd Class (Honours) or Pass without Honours may be allowed to improve his/her performance in the next two year immediately from the year of publication of result. He/she shall be allowed to improve in Honours paper only. However he / she has to fill up the form of all the Honours papers of odd semester (I/III/V) and even semester (II/IV/VI). In such case, the highest mark secured in each paper shall be considered for computation of the mark.

1.11   **Discipline in the examination**

1.11(a)   The students are allowed to enter the examination hall half an hour before the commencement of examination. A student arriving in the examination hall / room fifteen minutes after the commencement of the examination shall not be ordinarily allowed to sit for the examination. No examinee shall be allowed to go out of the examination hall within one hour of the commencement of examination.

1.11(b)   The students are allowed to enter the examination hall only with a valid admit

card and Identity card. Mobile phones and any other electronic gadgets are strictly prohibited in the examination hall. The possession of such things in the examination hall shall be treated as malpractice.

1.11(c) The possession of unauthorized materials and using it / copying from the scripts of other students / from any other source, sharing his/her answer scripts with other, creating disturbance or acting in a manner, so as to create inconvenience for the other students / invigilators inside the examination hall shall be treated as adoption of unfair means or malpractice.

In case of adoption of unfair means by an examinee in the examination hall / outside, the invigilator shall immediately report to the Centre Superintendent in writing along with the incriminating material recovered from the examinee signed by both the examinee and invigilator. The Centre Superintendent shall refer the matter to the Controller of Examinations for necessary disciplinary action as per the rules and regulations of the University.

1.12   Issue of Grade sheet, Provisional Certificate, Award of Degree & Gold Medals.

After the publication of the result of Semester examination, the Controller of Examinations shall issue the grade sheet of each semester as per the prescribed format (Appendix-I) and provisional certificate cum grade sheet after the final semester examination as per the prescribed format (Appendix-II) to the candidates against a prescribed fee collected at the time admission / filling of form. A degree certificate under the official seal of the university and signed by Vice-Chancellor as per the prescribed format (Appendix-III) shall be issued / given to the successful students of a particular course at the convocation or in-absentia on submission of application and fee as prescribed.

For award of gold medals, the University shall form a committee. The best graduate shall be decided from amongst the toppers of each Honours. In case of equality of CGPA, the SGPA of last semester examination shall be considered. The students who have failed / remained absent / improved their marks by repetition or improvement shall not be eligible for University rank or gold medal.

By order of Syndicate

Registrar
G.M. University, Sambalpur

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
B. Sc. Honours in B.SC. IST (INFORMATION SCIENCE & TELECOMMUNICATION)

Semester		CORE COURSE (14)	Ability Enhancement Compulsory Course (AECC) (2)	Ability Enhancement Elective Course (AEEC) (2) (Skill Based)	Elective: Discipline Specific DSE (4)	Elective: Generic (GE) (4)
I	CCI	Programming Fundamentals using C & C++	Environmental Studies			GE-I Digital Electronics
	CCII	Electronics Circuits				
II	CCIII	Programming in JAVA	English Communication/ Odia/ Hindi			GE-II Foundation in Mathematics
	CCIV	Computer System Architecture				
III	CCV	Data Structure		SEC -I Communicative English and English Writing		GE-III Physics (Electrostatics, Electricity and Magnetism)
	CCVI	Communication Electronics				
	CCVII	Discrete Structure				
IV	CCVIII	Computer Networks		SEC -II SQL/Python		GE-IV Foundations of Management & Organization Behaviour
	CCIX	Digital Signal Processing				
	CCX	Operating system				
V	CCXI	Microprocessor & Microcontrollers			DSE-I Embedded Systems Design/Web Tech.	
	CCXII	Database Management System			DSE -II Software Engineering/ Cloud Computing	
VI	CCXIII	Modern Communication System			DSE -III Computer Graphics/AI	
	CC XIV	Design and Analysis of Algorithm			DSE -IV Project Work/ Dissertation	

Course Structure for B. Sc. IST (Honours)

Semester	Course Name	Course Offered	Title Of Paper	Credits	Marks
I 4 Papers 350 marks 20 Credits	AECC	Ability Enhancement Compulsory Course-I	**Environmental Studies**	2	50 (10+40)
	Generic Elective	Generic Elective -1	DE	4	75 (15+60)
		Generic Elective -1 Practical	Practical	2	25
	Core Course	Core Course-I	Programming Fundamentals using C & C++	4	75 (15+60)
		Core Course-I Practical	Practical	2	25
		Core Course-II	EC	4	75 (15+60)
		Core Course-II Practical	Practical	2	25
II 4 Papers 350 marks 20 Credits	AECC	Ability Enhancement Compulsory Course II	English Communications / Odia / Hindi	2	50 (10+40)
	Generic Elective	Generic Elective -II	Foundation in Mathematics	4	75 (15+60)
		Generic Elective -II Practical	Practical	2	25
	Core Course	Core Course-III	Programming in JAVA	4	75 (15+60)
		Practical Core Course-III	Practical	2	25
		Core Course-IV	Computer System Architecture	4	75 (15+60)
		Core Course-IV Practical	Practical	2	25
III 5 paper 450 Marks 26 Credits	SEC	Skill Enhancement Course -I	Communicative English and English Writing	2	50 (10+40)
	Generic Elective	Generic Elective - III	Physics (Electrostatics, Electricity and Magnetism)	4	75 (15+60)
		Generic Elective -III Practical	Practical	2	25
	Core Course	Core Course-V	Data Structure	4	75 (15+60)
		Core Course-V Practical	Practical	2	25
		Core Course-VI	Communication Electronics	4	75 (15+60)
		Core Course-VI Practical	Practical	2	25
		Core Course-VII	Discrete Structure	4	75 (15+60)
		Core Course-VII Practical	Practical	2	25
IV 5 Papers 450 Marks 26 Credits	SEC	Skill Enhancement Course -II	SQL/ Python	2	50 (10+40)
	Generic Elective	Generic Elective - IV	Foundations of Management & Organization Behaviour	4	75 (15+60)
		Generic Elective -iv Practical	Practical	2	25
	Core Course	Core Course-VIII	Computer Networks	4	75 (15+60)
		Course-VIII Practical	Practical	2	25
		Core Course-IX	Digital Signal Processing	4	75 (15+60)
		Core Course-IX Practical	Practical	2	25
		Core Course-X	Operating system	4	75 (15+60)

		Course-X Practical	Practical	2	25

Semester	Course Name	Course Offered	Title Of Paper	Credits	Marks
V 4 Paper 400 marks 24 credits	DSE	Discipline Specific Elective I	Embedded Systems Design/ Web Tec	4	75 (15+60)
		Discipline Specific Elective -1 Practical	Practical	2	25
		Discipline Specific Elective -II	Software Engineering/ CC	4	75 (15+60)
		Discipline Specific Elective- II Practical	Practical	2	25
	Core Course	Core Course-XI	Microprocessor & Microcontrollers	4	75 (15+60)
		Core Course-XI Practical	Practical	2	25
		Core Course-XII	Database Management System	4	75 (15+60)
		Core Course-XII Practical	Practical	2	25
VI 4 paper 400 marks 24 credits	DSE	Discipline Specific Elective -III	Computer Graphics/AI	4	75 (15+60)
		Discipline Specific Elective - III Practical	Practical	2	25
		Discipline Specific Elective- IV	Dissertation / Project work	6	100
	Core Course	Core Course-XIII	Modern Communication System	4	75 (15+60)
		Core Course-XIII Practical	Practical	2	25
		Core Course-XIV	Design and Analysis of Algorithm	4	75 (15+60)
		Core Course-XIV Practical	Practical	2	25
Total				140	2400

SEMESTER – I

Ability Enhancement Compulsory Course (AECC I): Environment Studies

Credits – 2, Full marks 50 (Mid Term 10 + End Term 40)
(Unit wise question pattern, answer one question from each unit)

Unit I: Introduction to environmental studies
- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

Ecosystems: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems :
   a) Forest ecosystem
   b) Grassland ecosystem
   c) Desert ecosystem
   d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit II: Natural Resources: Renewable and Non-renewable Resources
- Land resources and landuse change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit III: Biodiversity and Conservation
- Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit IV: Environmental Pollution
- Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.

Environmental Policies & Practices
- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).

- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Suggested Readings:

1. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
4. Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science,* 339: 36-37.
7. McCully, P. 1996. *Rivers no more: the environmental effects of dams* (pp. 29-64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. *Environment*. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India. Tripathi 1992*.
14. Sengupta, R. 2003. *Ecology and economics*: An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology*: *Voices from the Tropics*. John Wiley & Sons.
17. Thapar, V. 1998. *Land of the Tiger*: *A Natural History of the Indian Subcontinent*.
18. Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
19. Wilson, E. O. 2006. *The Creation: An appeal to save life on earth*. New York: Norton.
20. World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University Press.

B. Sc. IST GE I: Introduction to Information Science
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit-I: Introduction to Computers-Introduction, Characteristics of Computers, Block diagram of computer. Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers. Data Organization, Drives, Files, Directories. Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM. Secondary Storage Devices (FD, CD, HD, Pen drive)
I/O Devices (Scanners, Plotters, LCD, Plasma Display) Number Systems .Introduction to Binary, Octal, Hexadecimal system, Conversion, Simple Addition, Subtraction, Multiplication

Unit-II: Types of Programming Languages- (Machine Languages, Assembly Languages, High Level Languages).

Algorithm and Flowcharts-Algorithm: Definition, Characteristics, Advantages and   disadvantages, Examples, Flowchart: Definition, Define symbols of flowchart, Advantages and disadvantages, Examples

Unit III: Operating System and Services in O.S. DOS –History, Files and Directories, Internal and External Commands, Batch Files, Types of O.S.

Windows Operating Environment- Features of MS – Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush.

Unit IV: Editors and Word Processors -Basic Concepts, Examples: MS-Word, Introduction to desktop publishing.
Spreadsheets and Database packages-Introduction to MS-Excel, Purpose, usage, command, MS-Excel, Creation of files in MS-Access, Switching between application, MS-PowerPoint.
Introduction to internet, Technical and business topics related to conducting business over internet, e-mail, B2B, B2C, Electronics (Cyber Law) Security and privacy issue.

Referential Books :
1. Fundamental of Computers – By V.Rajaraman B.P.B. Publications
2. Fundamental of Computers – By P.K. Sinha 3.R.K.Jain - Fundamental of computers
3. Computer Today- By Suresh Basandra
4. Unix Concepts and Application – By Sumitabha Das
5. MS-Office 2000(For Windows) – By Steve Sagman
6. Computer Networks – By Tennenbum Tata MacGrow Hill Publication
7. Computer Fundamentals- by D.P.Nagpal. (S.Chand)
8. Dr. C.S. Rayudu‖ E-commerce, E Business‖ Himalaya Publishing House.

B. Sc. IST-GE-1P: Introduction to information Science Lab
Practical: 20 Classes (2hrs duration)
25 marks

(Students has to perform any 20 practical assignments as decided by the concern faculty)

Sl.	Topic	Assignment
1	DOS Commands	Create a tree structure having directory, sub-directories and files using appropriate Dos commands. (GMC)
2	DOS Commands	Create a tree structure having directory, sub-directories and files using appropriate Dos commands. (Earth)
3	Windows	Write down the process to create a folder with your name in any drive of your choice
4	Windows	Write down the process to save a file under your folder assuming the folder case in My Documents and copy the same folder to E:
5	Windows	Write down the process to search the file with an extension of ".txt" available on D:
6	Ms-Paint	Write down the process to draw and colour a picture in paint.
7	Ms-Paint	Write down the process to change the background to a paint file created by you.
8	Word Pad	Write an application to your head of the department for granting one day leave and write the process to insert date & time and to change the font in word pad.
9	Note Pad	Write an application to your head of the department for granting permission for a cricket match
10	Ms-Word	Write down the process to create a file in Ms-Word named as 'student'. Write an application to your principal through the head of the department for granting leave for your sister's marriage. Saved it in my document. Create a folder in my document. Create a folder in my document named as 'IST'. Inside the 'IST' folder create another folder and named it as 'BScIST' file. Save one copy of 'student' file in 'BScIST' folder. Copy the 'BScIST' file to the desktop of your system and rename it as leave application. Delete it (i) Using right click (ii) Single left click of your mouse. Restore the deleted folder from recycle bin. Cut the application from desktop and store in D: drive under a new folder which is named in your name.
11	Ms-Word	Write down the process to change the paragraphs of above assignment (Student document)
12	Ms-Word	Write down the process to change the first letters of each word to capital whole at a time of above assignment (Student document)
13	Ms-Word	Write down the process to create different header to a different pages
14	Ms-Word	Write down the process to create the following structure. 1. Book • Complete Reference of C • Programming on C + + • Computer Fundamental 2. Operating System (i) MS DOS (ii) Windows 9X (iii) Linux (iv) Window Vista
15	Ms-Word	Write down the process to create your own bio-data in Ms-word format it by using different formatting option of Ms-word. In your bio-data represent your qualification, percentage of mark secure, year of passing.

16	Ms-Word	Write down the process to create a table to store student details of the student of a class with the following columns. The marks column should be divided into two parts one is secured mark and other is total mark. Then insert a column at the end of the table and name as remarks. Then insert a new column after honors column indicating male or female. Then remove the column class from the table. Insert information for 20 students.
17	Ms-Word	Create a Time-Table for an academic year of BSc IST students including 1st year, 2nd year, 3rd year.
18	Ms-Power Point	Write down the process to create a PPT for courses available in G.M. College
19	Ms-Power Point	Write down the process to create a PPT for facilities available in G.M. College
20	Ms-Power	Write down the process to create a PPT to present your Biodata
21	Ms-Excel	Write down the process to create a table in excel to store name, marks of 4 different subjects, total mark, percentage, division
22	Ms-Excel	Write down the process to create a record of students (by using the cut & paste method) selecting name, total mark, percentage, division columns from assignment-21, use a separate sheet for creating the new table insert a column called address after the name column and insert a new column called contact no. at the end of the table. Insert a new record for a new student after 5th row and at last or end of the row.
23	Ms-Excel	Write down the process to draw a graph taking the values of Name, Subject-1 & Subject-2 into sheet 2 and draw a column chart and line chart.
24	Ms-Excel	Write down the process to draw a graph taking the values of Roll No. and Percentage of marks and represent a pie-chart by taking 5 students information, each section will represent a different field effect.
25	Ms-Excel	Write down the process to display the top 10 records of the table on the basis of percentage and store that in a new sheet. Arrange all the records in ascending order of name and descending order of mark and store them in a new sheet.
26	Ms-Excel	Write down the process to display the students result for securing more than 60% in aggregate.

B. Sc. IST CC I: Programming Fundamentals using C & C++
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit-I: Introduction to C-History of C, Overview of Procedural Programming, Using main() function, Compiling and Executing Simple Programs in C.

Data Types, Variables, Constants, Operators and Basic I/O-Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getchar, putchar etc), Formatted and Console I/O (printf(), scanf()), Using Basic Header Files (stdio.h, conio.h etc).

Expressions, Conditional Statements and Iterative Statements-Simple Expressions in C (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative).

Unit-II: Functions and Arrays-Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

Derived Data Types (Structures and Unions)-Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures.

Unit-III: Pointers-Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, passing pointers as function arguments,using arrays as pointers, Passing arrays to functions.

Memory Allocation-Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions.
Introduction to C++-History of C++, Overview of Object-Oriented Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O in C++-Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Character I/O (getc, putc, etc), Formatted and Console I/O (cin, cout), Using Basic Header Files (iostream.h, etc).

Unit-IV: Using Classes in C++-Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables & Functions, Objects as parameters, Specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use. Introduction to Inheritance.

Text Books:
1. E. Balagurusamy, ‒Programming in ANSI C‖ (TMH).
2. Yashbant Kanetkar, ― Let's C‖.
3. The Complete reference C. (TMH)
4. E.Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.

Reference Books

1. A.K.Rath, A.K.Jagadev and S.K.Swain, ― Programming in C‖, Published by SCITECH Publicaton 2008.
2. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
3. BjarneStroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley , 2013.
4. BjarneStroustroup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
5. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
6. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
7. Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000.
8. A.K.Rath, A.K.Jagadev and S.K.Swain, ‒Computers fundamentals and C Programming‖,Published by SBG Publicaton 2003 /Published by SCITECH Publicaton 2006
9. Scott Meyers, "Effective C++", 3rd Edition, Published by Addison-Wesley, 2005.
10. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014
11. Walter Savitch, "Problem Solving with C++", Pearson Education, 2007.
12. 4A.K.Jagadev, A.K.Rath and S.N. Dehuri, ‒Object Oriented Programming Using C++‖, Published by Prentice Hall of India, 2007.
13. Stanley B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Published by Addison- Wesley, 5th Edition, 2012
14. Jeyapoovan T, ‒A First Course in Programming with C‖
15. Jeyapoovan T, ‒Fundamentals of Computing and Programming in C‖
16. Khurana Rohit, ‒Object Oriented Programming with C++‖
17. Subburaj R, ‒Object Oriented Programming with C++‖
18. Panigrahi Goutam/ Das Anirban, ‒Object Oriented Programming with C++‖
19. Subburaj R, ‒Programming in C,2e‖.

B. Sc. IST CCI Practical: Programming Fundamentals using C/C++ Lab
Practical: 20 Classes (2hour duration)
25 marks
(Students has to perform any 20 practical assignments as decided by the teachers)

1. WAP to print the sum and product of digits of an integer.

2. Write a C program to display the total mark using scanf.
3. Write a C program to add two numbers and display the sum.
4. Write a C program to display your name.
5. WAP to reverse a number.
6. Write a C program to display your mark secured in business communication, digital electronics, operating system, practical mark, total mark.
7. Write a C program to display your complete bio-data.
8. Write a C program to calculate the area and perimeter of a square assuming that the side of the square is given.
9. Write a C program to calculate the area and perimeter of a rectangle assuming that the length and width is given.
10. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

11. WAP to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+……
12. WAP to compute the sum of the first n terms of the following series S =1-2+3- 4+5…………….
13. Write a structure program to compare rollno, name, marks of two students. If they are equal or not. Display the name, rollno and marks of the students.
14. Write a C program to calculate the area and perimeter of a right angled triangle if the base and the height are given.
15. Write a C program to calculate the surface area and volume of a sphere if the radius is given.
16. Define a structure type –personal‖ that would contain person name, date of joining and salary. Using this structure write a program to read this information for one person from keyboard and display on the screen.

17. Write to accept two values for a and b. Swap their value using pointers. Display the values of a and b before and after swapping.
18. Write a program using pointers to compute the sum of all elements stored in one array.

19. Write a C program to add a variable with NULL (define NULL is 0).
20. Write a C program to calculate the surface area and volume of a sphere (define PIE is 3.141).
21. Write a C program to display the days of a week by using switch statement.(Using serial number)
22. Write a program to read three number from the keyboard and display the largest one using nested-if-else statement.
23. Write a program using switch case for arithmetic operations like addition, substraction, multiplication and division.
24. Write a program to accept two integers from the user. The first should be greater than the second one. Calculate the addition, substration, multiplication and division. Display the result.
25. Write a program using array to find out all he even and odd number separately.

26. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.

27. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.

28. WAP to compute the factors of a given number.

29. Write a macro that swaps two numbers. WAP to use it.
30. WAP to print a triangle of stars as follows (take number of lines from user):

```
        *
       ***
      *****
     *******
    *********
```

31. WAP to perform following actions on an array entered by the user:
a. Print the even-valued elements
b. Print the odd-valued elements
c. Calculate and print the sum and average of the elements of array
d. Print the maximum and minimum element of array
e. Remove the duplicates from the array
f. Print the array in reverse order

32. The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.

33. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.

34. Write a program that swaps two numbers using pointers.

35. Write a program in which a function is passed address of two variables and then alter its contents.

36. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.

37. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.

38. Write a menu driven program to perform following operations on strings:
39. Show address of each character in string
40. Concatenate two strings without using strcat function.
41. Concatenate two strings using strcat function.
42. Compare two strings
43. Calculate length of the string (use pointers)

44. Convert all lowercase characters to uppercase
45. Convert all uppercase characters to lowercase
46. Calculate number of vowels
    i) Reverse the string

47. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.

48. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
49. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
50. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
51. Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-D array implementation):
    a) Sum b) Difference c) Product d) Transpose
52. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
53. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.

54. Create a class Box containing length, breath and height. Include following methods in it:
    a. Calculate surface Area
    b. Calculate Volume
    c. Increment, Overload ++ operator (both prefix & postfix)
    d. Decrement, Overload -- operator (both prefix & postfix)
    e. Overload operator == (to check equality of two boxes), as a friend function
    f. Overload Assignment operator
    g. Check if it is a Cube or cuboid
55. Write a program which takes input from the user for length, breath and height to test the above class.
56. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
57. Write a program to retrieve the student information from file created in previous question and print it in following format:
    1. Roll No. Name Marks
58. Copy the contents of one text file to another file, after removing all whitespaces.
59. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
60. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in   ascending and descending order.
61. Write a program to read two numbers from the keyboard, swap them. Display the value of the first and second before swapping and after swapping by using third variable say C.
62. Write a program to swap the value of two variable say p and q without taking the help of third variable and display them.
63. Write a program to receive three integer variables from the user. Display the biggest among these three.
64. Write a program to receive the base and height of a right angle triangle from the user and display the area and perimeter of it.
65. Write a program to receive the Basic salary of an employee from the user. Calculate his/her net salary and display it DA is 72% of Basic salary, HRA is 10% of Basic salary. Income tax is 5% of net income, if net income is more than 1.5 lakh per annum. Income tax is 20% of net income, if net income is more than 7 lakh per annum.
66. Write a program to calculate the net salary of a person. The basic salary should be defined by the user. DA and HRA are 72% and 10% respectively of the basic salary. He or she will have to pay 20% income tax from his net salary. 5% will be deducted towards the provident   fund. 3% will be deducted for LIC. 1% will be donated to a charitable trust. Rest money will be saved in his saving account. Display total income, expenditure and saving of his saving   account. Display this for 10 employees.
67. Write a program to display whether a person is physically normal and abnormal. If a person's weight is less then 50 kg. and height greater than 170 cm., than he is abnormal. The weight and height should be entered by the user.
68. Write a program by using switch case to display the grade of a student. If a student has secured more than 69%, than 1st class with distinction. If a student has secured more than 59%, than 1st class. If a student has secured more than 49%, than 2nd class. If a student has secured more than 29%, than 3rd class, otherwise fail.
69. Write a program to display a given range of even and odd numbers in reverse order. The range should be given by the user by using for loop.
70. Write a program to add the marks of five subjects of a student and display the total marks.
71. Write a program to display the even and odd numbers between two given number using while loop.
72. Write a program using array to find out the biggest number from them.

73. Write a program to declare a two dimensional array to store data for a 3*3 matrix. Display the array after inserting the values.
74. Write a program to declare two 3*3 matrix. Enter the values to them and display them. Add these two matrices and display the resultant matrix.
75. Write a program to arrange the values of an one dimensional array in ascending orders. Display the array before arranging and after arranging
76. Write a program to arrange the values of an one dimensional array in descending orders. Display the array before arranging and after arranging.
77. Write a program to calculate the addition, substraction, multiplication and division in user defined functions say add, sub, mul, div respectively.
78. Write a program in user defined function say add, sub, mul, div respectively to calculate the addition, substraction, multiplication and division in main function.
79. Write a program to find the biggest among three numbers using user defined function.

80. Write a program to find out the biggest numbers in an array using a user defined function.
81. Write a program to copy one string into another and count the number of characters copied.

82. Write a program to declare three string variables, read two string constants s1 and s2 and compare whether they are equal or not? If they are not equal than join them together and copy the content to s3. Now display the content of all the strings and their lengths.

B. Sc IST CC II Practical: Computer System Architecture
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit I: Introduction-Logic gates, boolean algebra, combinational circuits, circuit simplification, flip- flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

Data Representation and Basic Computer Arithmetic-: Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers.

Unit II: Basic Computer Organization and Design-Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input -output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

Unit III: Central Processing Unit-Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures.

Unit IV: Memory Organization-Cache memory, Associative memory, mapping.
Input-Output Organization-Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.
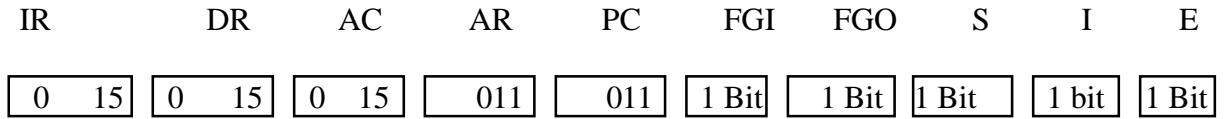
Recommended Books:

1. M. Mano, Computer System Architecture, Pearson Education 1992

2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004
   th

3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8
   Edition, Prentice Hall of India,2009

4. M.M. Mano , Digital Design, Pearson Education Asia,2013

5. Carl Hamacher, Computer Organization, Fifth edition, McGrawHill, 2012.
6. Computer Organisation G.V>Anjane Yulu(Himalaya Publishing House) md Edition

B. Sc. IST-CC II Practical: Computer System Architecture Lab
Credits – 2 , Full Marks – 25,
(Students has to perform any 15 practical assignments as decided by the concern faculty)

1. Create a machine based on the following architecture:

| IR | DR | AC | AR | PC | FGI | FGO | S | I | E |

| 0   15 | 0   15 | 0   15 | 011 | 011 | 1 Bit | 1 Bit | 1 Bit | 1 bit | 1 Bit |

Memory 4096 words 16 bits per word	Instruction format 3 4 0 Address 15 Opcode

Basic Computer Instructions

Memory Reference			Register Reference		Input-Output		
Symbol	Hex		Symbol	Hex	Symbol	Hex	
AND	0xxx		CLA	E800	INP	F800	
ADD	2xxx		CLE	E400	OUT	F400	
						F20	
LDA	4xxx		CMA	E200	SKI	0	
						F10	
STA	6xxx		CME	E100	SKO	0	
						F08	
BUN	8xxx		CIR	E080	ION	0	
						F04	
BSA	Axxx		CIL	E040	IOF	0	
ISZ	Cxxx		INC	E020			
AND_I	1xxx		SPA	E010			
ADD_I	3xxx		SNA	E008			
LDA_I	5xxx	Indirect	SZA	E004			
STA_I	7xxx	Addressing	SZE	E002			
BUN_I	9xxx		HLT	E001			
BSA_I	Bxxx						
ISZ_I	Dxxx						

Refer to Chapter-5 of Morris Mano for description of instructions.

2. Create the micro operations and associate with instructions as given in the chapter (except interrupts). Design the register set, memory and the instruction set. Use this machine for the assignments of this section.

3. Create a Fetch routine of the instruction cycle.
4. Simulate the machine to determine the contents of AC, E, PC, AR and IR registers in hexadecimal after the execution of each of following register reference instructions:

a. CLA	e. CIR	i. SNA
b. CLE	f. CIL	j. SZA
c. CMA	g. INC	k. SZE
d. CME	h. SPA	l. HLT

Initialize the contents of AC to $(A937)_{16}$, that of PC to $(022)_{16}$ and E to 1.

5. Simulate the machine for the following memory-reference instructions with I= 0 and address part = 082. The instruction to be stored at address 022 in RAM. Initialize the memory word at address 082 with the operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after the execution.
    a. ADD   f. BSA
    b. AND   g. ISZ
    c. LDA
    d. STA
    e. BUN

6. Simulate the machine for the memory-reference instructions referred in above question with I= 1 and address part = 082. The instruction to be stored at address 026 in RAM. Initialize the memory word at address 082 with the value 298. Initialize the memory word at address 298 with operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after the execution.

7. Modify the machine created in Practical 1 according to the following instruction format:

Instruction format

0	2	3	4	15
Opcode		I	Address	

a. The instruction format contains a 3-bit opcode, a 1-bit addressing mode and a 12-bit address. There are only two addressing modes, I = 0 (direct addressing) and I = 1 (indirect addressing).

b. Create a new register I of 1 bit.

c. Create two new microinstructions as follows :

i. Check the opcode of instruction to determine type of instruction (Memory Reference/Register Reference/Input-Output) and then jump accordingly.
ii. Check the I bit to determine the addressing mode and then jump accordingly.

8.   To study and verify the AND and NAND function using OMEGA TYPE LTB – 806.
9.   To study and verify the OR function using NAND gate using logical trainer kit OMEGA TYPE

LTB – 806

10. To study and verify the Ex-OR and AND gate operation using OMEGA TYPE LTB – 805.

11. To study and verify the $F = A (B+C)$ using OMEGA TYPE LTB – 806.

12. **To study and verify of majority logic** $F = ABC + A\bar{B}C + AB\bar{C} + \bar{A}BC$ using Logical trainer kit.

13. To study and verify the coincidence circuit with the help of NAND gate or Ex-NOR gate using OMEGA TYPE LTB – 806

14. To study and verify the operation of BCD to Decimal decoder using OMEGA TYPE LTB – 825

15. To study and verify the Decimal decoder to BCD using OMEGA Type LTB – 856.

16. To determine the operation of BCD to 7 segment decoder/driver using OMEGA TYPE LTB – 850.

17. To study and verify the Multiplexer circuit using logical trainer kit OMEGA TYPE LTB – 850

18. To study and verify Binary to Decimal Encoder using OMEGA TYPE LTB – 814.

19. To study and verify the Demultiplexer circuit using the logical trainer kit OSAW INDIA DI – 7.

20. To study and verify the action of Half Adder circuit using logical trainer kit OMEGA OSAW DI – 10.

21. To study and verify the Half Substrator and Full Substractor circuit using trainer kit OMEGA OSAW DI – 17.

22. To construct J-K flip flop.

23. To study and verify S-R flip flop without using clock.

24. To study and verify S-R flip flop using clock.

25. To study and verify D – flip flop using OMEGA TYPE LTB – 805.

26. To study and verify the J-K master slave flip flop electronic component required.

27 To study and verify T – flip flop.

28. To observe the carrier wave form in CRO.

SEMESTER II
Ability Enhancement Compulsory Course (AECC II): English Communication
Credits – 2, Full marks 50 (Mid Term 10 + End Term 40)
(Unit wise question pattern, answer one question from each unit)
MIL (ALTERNATIVE ENGLISH)

Introduction:

The paper is focused upon developing one fundamental skills of Language learning; reading which needs a thorough rethink and revision. In order to build a strong base for acquisition of the communication skills, suitable reading content is selected from diverse areas in prose form. This would boost the learner's competence in expressive and comprehension skills. The well researched language exercises in the form of usage, vocabulary and grammar is the other area that should attract the teacher and learner to work out for giving decent shape to the mastery of English language.

UNIT 1: Short Story

(i) Jim Corbett-The Fight between Leopards
(ii) Dash Benhur- The Bicycle
(iii)Dinanath Pathy- George V High
School
(iv) Alexander Baron- The Man who knew too much
(v) Will f Jenkins- Uneasy Homecoming

UNIT 2: Prose

(i) Mahatma Gandhi- The way to Equal Distribution
(ii) S Radhakrishnan- A Call to Youth
(iii)C V Raman-Water- The Elixir of
Life (iv)Harold Nicolson- An
Educated Person
(v) Claire Needell Hollander- No Learning without Feeling

UNIT 3:

(i)   Comprehension of a passage and answering the questions

UNIT 4:

(i)   Language exercises-test of vocabulary, usage and grammar

Text Books
All Stories and Prose pieces

Reference Books
- *The Widening Arc: A Selection of Prose and Stories*, Ed. A R Parhi, S Deepika, P Jani, Kitab Bhavan, Bhubaneswar.
- *A Communicative Grammar of English*, Geoffrey Leech.
- *A University Grammar of English,* Randolph Quirk and Sidney Greenbaum
- *Developing Reading Skills*. F. Grellet. Cambridge: Cambridge University Press, 1981.

B. Sc. IST-GE II: Foundation in Mathematics
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)
(Scientific calculator may be allowed in the examination)

Unit-I Ordinary Differential Equations: First Order Ordinary Differential Equations, Basic Concepts, Separable Ordinary Differential Equations, Exact Ordinary Differential Equations, Linear Ordinary Differential Equations. Second Order homogeneous and non-homogeneous Differential Equations.

Unit-II: Series solution of differential equations and special functions: Power series method, Legendre Polynomials, Frobenius Method, Bessel's equations and Bessel's functions of first and second kind. Error functions and gamma function.

Unit-III: Matrices: Introduction to Matrices, System of Linear Algebraic Equations, Gaussian Elimination Method, Gauss -Seidel Method, LU decomposition, Solution of Linear System by LU decomposition. Eigen Values and Eigen Vectors, Linear Transformation, Properties of Eigen Values and Eigen Vectors, Cayley-Hamilton Theorem, Diagonalization, Powers of a Matrix. Real and Complex Matrices, Symmetric, Skew Symmetric, Orthogonal Quadratic Form, Hermitian, Skew Hermitian, Unitary Matrices.

Unit-IV: Fourier Analysis & Lap lace transformation: Fourier series expansion of any periodic signals and fourier transforms, spectrum of periodic and non-periodic signal, Lap lace transform introduction and Lap lace transform of periodic function integrals, derivatives and inverse Lap lace transformation.
Numerical Differentiation and Integration: Introduction, Numerical Differentiation based on interpolation formula, derivatives using forward interpolation, derivatives using backward interpolation, errors in Numerical differentiation, numerical Integration based on interpolation, trapezoidal Rule, Simpson's one-third Rule, Simpson's three-eight rule.

Suggested Books

1. E. Kreyszig, advanced engineering mathematics, Wiley India (2008)
2. Murray Spiegel, Seymour Lipschutz, John Schiller, Outline of Complex Variables, Schaum Outline Series, Tata McGraw Hill (2007)
3. R. K. Jain, and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House (2007)
4. C .R. Wylie and L. C. Barrett, Advanced Engineering Mathematics, Tata McGraw-Hill (2004)
5. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Limited (2007)
6. Higher Engineering Mathematics - By B.S.Grewal
7. Engineering Mathematics - By H.K. Das
8. Engineering Mathematics – By Erwin & Kreyszig

B. Sc. IST-GE II: Foundation in Mathematics Lab
Practical: 20 Classes (2hrs duration)
25 marks
(Students has to perform any 05 practical experiment using C/C++/JAVA Programming as decided by the concern faculty)

1. Find the Sum of any two matrices of equal size N.
2. Find the Eigen values and Eigen vectors using power method. The order of the   matrix the elements and column vector should be given at run time.

$$\text{(I).} \quad A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix} \quad \text{(II).} \quad B = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$$

3. If $A = \begin{bmatrix} a11 & a12 \\ a21 & a22 \end{bmatrix}$, $B = \begin{bmatrix} b11 & b12 \\ b21 & b22 \end{bmatrix}$, Find the product AB of the matrices

   A and B.

4. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$

5. Compute the integral $\int_0^3 e^{-x2} \, dx$ by trapezoidal rule with h=0.5

6. WAP using Simpson's $\frac{1}{3}$ rule where the no. of records to be used(N) will be received from the user and the values x_i & y_i (where i=0,1....N) also be received from the user.

7. Compute the integral $\int_0^1 e^{-x2} \, dx$ by Simpson's rule taking h=.02 and n=s

8. Evaluate $I = \int_0^1 \frac{dx}{itx}$ using trapezoidal rule with 4 equal sub integrals.

9. Evaluate $I = \int_0^1 \frac{dx}{itx}$ using Simpson's $\frac{1}{3}$ rule with 4 equal sub integrals.

10. Evaluate $I = \int_0^1 \frac{1}{x}$ using Simpson's $\frac{1}{3}$ rule with 6 equal sub integrals.

11. Evaluate $I = \int_0^1 \frac{1}{x} \, dx$ using trapezoidal rule with 6 equal sub integrals (or taking $h = \frac{b-a}{6} = \frac{2-1}{6} = \frac{1}{6}$)

12. Evaluate $I = \int_0^6 \frac{dx}{1+x^2} \, dx$ using trapezoidal rule taking with 6 equal sub integrals (or taking $h = \frac{b-a}{h} = \frac{6-0}{6} = 1$)

13. Evaluate $\int_0^6 \frac{dx}{1+x^2} \, dx$ using Simpson's $\frac{1}{3}$ rule taking h=1.

14. Use trapezoidal rule to evaluate $I = \int_0^1 x^3 \, dx$ consiilay tive sub integral .

15. Use Simpson's $\frac{1}{3}$ rule to evaluate $I = \int_0^1 x^3 \, dx$ taking n=6 equal sub integrals .

16. Evaluate $I = \int_0^1 \frac{dx}{1+x^2} \, dx$ using trapezoidal rule taking $h = \frac{1}{4}$.

17. Evaluate $I = \int_0^1 \frac{dx}{1+x^2} \, dx$ using simpson's $\frac{1}{3}$ rule taking $h = \frac{1}{4}$.

18. Solve the following linear equation using Gauss Elimination Methods:-
    3x+y+2z=3
    2x-3y-z=-3
    X+2y+z=4

19. Solve the following system of equations by Gauss-Seidal iteration method:-
    20x+y-2z=17
    3x+20y-z=-18
    2x-3y+20z=25

20. WAP to solve Euler's Method, Assuming that the value of x_0, y_0, h & x_n will   be given by the user at run time.

B. Sc. IST CC III: Programming in Java
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit-I

Object-Oriented Programming Overview: Principles of Object-Oriented Programming
Introduction to Java-Java Features,Differences between C++ and Java,Simple I/O using System.out and command line,Compiling and Executing a Java Program,Variables, Constants, Keywords Data Types,Type Conversion Operators and Expressions,Decision Making Constructs (conditional statements and loops) and Nesting,Defining & Using Classes, instance variables and methods, Creating & Using Objects,Java Methods (Defining, Scope, Passing and Returning Arguments) Built-in Java Class Methods

Unit-II

Constructors: Method Overloading,Class Variables & Methods,final classes and variables, abstract classes and methods, Object class, Garbage Collection.
Arrays, Strings and I/O-Creating & Using Arrays (One Dimension and Multi-dimensional)
Referencing Arrays Dynamically, Java Strings: The Java String class
Input using String Buffer Class and scanner class,Byte and character streams

Unit-III

Inheritance: (Single Level),types Method Overriding Interfaces, Extending interfaces
Packages and Class Visibility, Extending packages Using Standard Java Packages (lang, io)
Exception Handling: Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions

Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, suspending/resuming threads Overview of JDBC.

Unit-IV

Applets: Introduction to Applets, Writing Java Applets and executing applets
Working with Graphics, Incorporating Images, Graphic objects for drawing figures such as lines, rectangles, ovals. Design and Implementation of GUIs using the AWT components and controls such as Frame, labels, buttons, check boxes, radio buttons, text fields, text area, menus Swing components of Java Foundation Classes, Event Handling Mechanisms

Text books:

1. E. Balagurusamy, "Programming with Java", 4th Edition, McGraw Hill.2009.
2. C.Xavier, ‒"Programming with Java" Scitech Publication.
3. Herbert Schildet,‖ The Complete Reference Java‖.

Reference Books

1. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.
2. James Gosling, Bill Joy, Guy L Steele Jr, GiladBracha, Alex Buckley"The Java Language Specification, Java SE 8 Edition (Java Series)", Published by Addison Wesley,2014.
3. Joshua Bloch, "Effective Java" 2nd Edition,Publisher: Addison-Wesley, 2008.
4. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9th Edition,Printice Hall.2012
5. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 2 - Advanced Features)", 9th Edition, Printice Hall.2013
6. Bruce Eckel, "Thinking in Java", 3rd Edition, PHI, 2002.
7. Paul Deitel, Harvey Deitel, "Java: How to Program", 10th Edition, Prentice Hall, 2011.
8. "Head First Java", Orielly Media Inc. 2nd Edition, 2005.
9. David J. Eck, "Introduction to Programming Using Java", Published by CreateSpace independent Publishing Platform, 2009.
10. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2nd Edition, 2004.
11. Khurana Rohit, ‒Programming with Java‖

B. Sc. IST CC III Practical: Programming in Java Lab
Credits – 2, Full Marks – 25,
(Students has to perform any 20 practical assignments as decided by the teachers)

1. To find the sum of any number of integers entered as command line arguments
2. To find the factorial of a given number.
3. Write a program to find out the odd and even numbers available between 1 to 20.
4. Write a program to display your favourite food.
5. Write a program to display your name with different surname.
6. Write a program to display the even numbers, total even numbers and odd no's and total odd no.s given in an array.(if...else & for loop)
7. Write a program to calculate the area of a rectangle and circle in two different classes (implementing an interface and display the result).
8. Write a program to display the even numbers, total even numbers and odd no.s and total odd no.s given in an array.(if...else & for loop)
9. Write a program to display the color depending upon the code entered by an integer.Assuming that 1-is the color code: violet & 7-is the color code:red (VIBGYOR)
   a. using the readline method
   b. using the commandline method
10. Write a program to pass 10 subject mark and find out the highest mark secure, lowest,average mark & total mark secured by an student. All marks should passed through command line.
11. condition given for eligibility:weight-minimum 55kg,height-165 cm
    {hints:a list of candidates height should be given in an array. similarly the list of candidates weight should be given in another array}(if & for loop)
12. Write a program to calculate the interest gained by an account holder condition given:
    *for male-having balance more than 1 lakh rate of interest will be 8.5% of the principal amount
    *for female-having balance more than 1 lakh rate of interest will be 8.25% of the principal amount
    *for male- having balance 1 lakh rate of interest will be 8% of the principal amount.(nested ...if)
13. Write a program to display the result of 5 students whose roll no.s and respective secured marks are given into distinct arrays.
    a.use for loop & else...if ladder. b.use readline
    method & for loop.
14. Write a program using while loop for addition of 1st n no.s .(also in do...loop)
15. Write a program to display multiplication table using while loop.(also in do....loop)
16. Write a program to display

a.		b.			c.		d.		
*				*		* * * * *		1	
* *			* *			* * * *		2 2	
* * *			* * *			* * *	3	3	3
* * * *			* * * *			* *	4 4	4	4
* * * * *		* * * * *			*			

17. Write a program to compute the area of a circle and its circumference by parameter passing from the main function. Receive the radius of the circle from the user using readline method.
18. Write a program to display the name of a day based on the entered seriel number of the day(switch case)
19. Write a program to accept 5 numbers from commanding argument and display them using array.
20. Write a program to display the division or grade of a student based on his/her secured mark is 100.(else...if ladder).

21. To learn use of single dimensional array by defining the array dynamically.
22. To learn use of .length in case of a two dimensional array
23. To convert a decimal to binary number
24. To check if a number is prime or not, by taking the number as input from the keyboard
25. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument
26. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions(from lower to higher data type)
27. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword
28. Write a program to show the use of static functions and to pass variable length arguments in a function.
29. Write a program to demonstrate the concept of boxing and unboxing.
30. Create a multi-file program where in one file a string message is taken as input from the use and the function to display the message on the screen is given in another file (make use of Scanner package in this program).
31. Write a program 2 subject mark from the user using readline method and calculate and display the total mark secured, total %age secured and the division secured by the student assuming that full mark of each paper is 100.
32. Write a program to compute the area of a circle and its circumference using dot operator. The radius should be given by the user from the commandline.(using constructor)
33. Write a program to compute the area of a circle and its circumference by parameter passing from the main function. Receive the radius of the circle from the user using readline method.(using constructor)
34. Write a program to receive 2 subject mark from the user using readline method and calculate and display the total mark secured, total %age secured and the division secured by the student assuming that full mark of each paper is 100.(using constructor)
35. Write a program to demonstrate purely method overloading.
36. Write a program using inheritance in JAVA.

37. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate fibonacii series is given in a different file belonging to the same package.
38. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages
39. Write a program ―DivideByZero‖ that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
40. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.
41. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).
42. Write a program to demonstrate priorities among multiple threads.
43. Write a program to demonstrate multithread communication by implementing synchronization among threads (Hint: you can implement a simple producer and consumer problem).
44. Modify the ―distance‖ class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object
45. Write a program to create URL object, create a URLConnection using the openConnection() method and then use it examine the different components of the URLand content.
46. Write a program to implement a simple datagram client and server in which a message that is typed into the server window is sent to the client side where it is displayed.
47. Write a program that creates a Banner and then creates a thread to scrolls the message in the banner from left to right across the applet_s window.
48. Write a program to get the URL/location of code (i.e. java code) and document(i.e. html file).

49. Write a program to demonstrate different mouse handling events like mouse Clicked(), mouse Entered(), mouse Exited(), mouse Pressed, mouse Released() and mouse Dragged().
50. Write a program to demonstrate different keyboard handling events.
51. Write a program to generate a window without an applet window using main() function.
52. Write a program to demonstrate the use of push buttons.

53. Write a program to perform the arithmetic operation on any two numbers.
54. Write a program to calculate the area of a rectangle by passing the values of length and width as parameter.
55. Write a program to calculate the area for a rectangle using constructor (pass the values of length and width as commanding arguments).
56. Write a program to create 3 threads for 3 different tasks, run the program (2 times) and display the result.
57. Write a program (using method overloading) to calculate the area of a rectangular and square size room in two different constructors and display the result.
58. Write a program (using inheritance) to display the name, roll number, mark1, mark2 and total mark of a student.
59. Write a program to draw a rectangle using graphics.
60. Write a program to draw a polygon using graphics.

61. Write a program to find out the largest among 3 numbers given.(using nested...if)
62. Write a program to display the name of a city by entering the 1st letter of that city.
63. Write a program to compute the area of a circle and its circumference uding dot operator.the radius should be given by the user from the commandline argument.

64. Write a program that show working of different functions of String and StringBufferclasss like setCharAt(, setLength(), append(), insert(), concat()and equals().
65. Write a program to create a ―distance‖ class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer.
66. Write a program for preparation of a marksheet which calculates the total aggregate secured mark,aggregate percentage,total secured honours mark,total honours percentage assuming that individual papers secured mark and full mark is given.
67. Write a program to prepare the salary slip of an employee base on 6th pay commision pay scale.assuming that the basic,grade pay,DA percentage,HRA percentage,tax percentage etc are given.
68. Write a program to display your self introduction with a prefix "yahoo".
69. Write a program in java to count and display total number of candidates examnied,number of candidate qualified and number of candidate are disqualified for defence selection process.
70. Write a program in JAVA to recieve the internal marks and end term marks including the practicle from user.Assuming that full mark of all 4 papers are 100.Compute and calculate & display the marksheet of a student which includes individual paper marks(internal and end term marks should be shown separately),individual semester,total mark secured in an semester,grand total & division where the division is based on aggregate secured grand total(use inheritance).The i/p should be the Roll no. of a student ,individual paper & secured mark in end term and internal.
71. Write an applet program to create 3 buttons YES, NO & CANCLE.

B. Sc. IST CC IV: Electronics Circuits
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit- I: **Introduction to Electronics:** Signals, Analog and Digital Signal,
Diode Circuits: Introduction physical operation of p-n junction diode characterization of pn junction diode. Clipping and clamping circuits. Rectifiers: HWR, FWR (center tapped and bridge). Circuit diagrams, working and waveforms. Filters & their types. Zener diode regulator circuit diagram and explanation , disadvantages of Zener diode regulator.

Unit- II: Bipolar Junction Transistor: Simplified structure and physical operation of npn and pnp transistor. Current voltage characterization of BJT, Transistor biasing, circuit diagrams and their working. Transistor as an amplifier working, Darlington pair and its applications.

Unit- III: Feedback Amplifiers: Concept of feedback, negative and positive feedback, advantages and disadvantages of negative feedback, voltage (series and shunt), current (series and shunt) feedback amplifiers, gain, input and output impedances . Barkhausen criteria for oscillations, Study of phase shift oscillator, Colpitts oscillator and Hartley oscillator.

Unit- IV: MOSFET Circuits: Principle and physical operation of FETS and MOSFETS, P-channel and N-channel MOSFET, complimentary MOS, V-I characteristics of E-MOSFETS and D-MOSFETS.
 Power Amplifiers: The ideal op-amp, inverting and non-inverting, configuration, difference amplifier, CMRR, application of op-amp (Instrumentation – amplifier, Summing amplifier, Integrator and Differentiator. classification of power amplifiers, Oscillator Class A, Class B, Class C and their comparisons. Difference between voltage and power amplifier.

Suggested Books:

1. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, 9th Edition, 2013, PHI
2. Electronic devices, David A Bell, Reston Publishing Company
3. D. L. Schilling and C. Belove, Electronic Circuits: Discrete and Integrated, Tata McGraw Hill (2002)
4. Donald A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill (2002)
5. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
6. J. R. C. Jaegar and T. N. Blalock, Microelectronic Circuit Design, Tata McGraw Hill (2010)
7. J. J. Cathey, 2000 Solved Problems in Electronics, Schaum_s outline Series, Tata McGraw Hill (1991)
8. Allen Mottershed, Electronic Devices and Circuits, Goodyear Publishing Corporation
9. Principal of electronics, V.K.Mehta.
10. Fundamentals of electronics, M.L.Gupta

B. Sc. IST CC IV Practical: Electronics Circuits Lab
(Hardware and Circuit Simulation Software)
Credits – 2, Full Marks – 25,

1. Study of the half wave rectifier and Full wave rectifier.

2. Study of power supply using C filter and Zener diode.

3. Designing and testing of 5V/9 V DC regulated power supply and find its load-regulation

4. Study of clipping and clamping circuits .

5. Study of Fixed Bias, Voltage divider and Collector-to-Base bias Feedback configuration for transistors.

6. Designing of a Single Stage CE amplifier.

7. Study of Class A, B and C Power Amplifier.

8. Study of the Colpitt_s Oscillator.

9. Study of the Hartley_s Oscillator.

10. Study of the Phase Shift Oscillator

11. Study of the frequency response of Common Source FET amplifier.

SEMESTER-III
English SEC-I: Communicative English & English Writing skill
50 (10+40) marks, 02 credits

Unit I: Introduction to the essentials of Business Communication: Theory and practice
Communication: Definition, Process, Purpose, Communication Network, Types of Communication, Barriers to communication

Unit II: Mechanics of Writing
Stages of writing, Preparing Notes, Style and Tone, linguistic unity, coherence and cohesion, How to Compose Business Messages, Citing references, and using bibliographical

Unit III: Writing a project report
Report planning, Types of Reports, Developing an Outline, Sections of the Report

Unit IV: Writing minutes of meetings, Circular, Notices, Memos, Agenda

E-correspondence: E-mails, Business Letter Format, Styles, Types of Letter

Suggested Readings:
1. Scot, O.; Contemporary *Business Communication*. Biztantra, New Delhi.
2. Lesikar, R.V. &Flatley, M.E.; *Basic Business Communication Skills for Empowering the Internet Generation*, Tata McGraw Hill Publishing Company Ltd. New Delhi.
3. Ludlow, R. & Panton, F.; *The Essence of Effective Communications*, Prentice Hall of India Pvt. Ltd., New Delhi.
4. R. C. Bhatia, *Business Communication*, Ane Books Pvt Ltd, New Delhi

B. Sc. IST GE III: Physics (Electrostatics, Electricity and Magnetism)
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit I : Vectors, Dot and cross product of vectors, Triple product of Vectors, Gradient of a scalar, Divergence and curl of a Vector (Expressions only)**.**Gauss's laws in electrostatics (statement and proof), Applications of Gauss's law:

Unit II: Electric field due to (i) a informally changed sphere,(ii) a informally changed cylinder,(iii) a plane sheet of charge. Parallel plate capacitor, cylindrical capacitor.Energy stored in electric field, Electric dipole, Force and torque on a dipole placed in an uniform electric field.

Magnetic effect of current, Biot-savart's Law- Application of Biot-Savart's Law: Magnetic field due to (i) and infinitely long straight current carrying conductor (ii) a circular current carrying coil at an axial point (iii) a current carrying solenoid. Amper's Law, its applications to long straight conductor and solenoid.

Unit III: Force between two parallel current carrying conductors, Torque on a current carrying coil placed in a uniform magnetic field. Principle of moving coil Galvanometer, Transient current in L-R and C-R circuits, Time constant of L-R & C-R circuit.

Unit IV: Faraday's laws of electromagnetic introduction. Lenz's law, self induction & coefficient of self induction, mutual induction & coefficient of mutual induction, self inductance of a solenoidal coil, mutual induction of two co-axial solenoidal coils, self inductance of an arbitrary circuit, mutual inductance of two arbitrary circuits.
Alternating current, alternating e.m.f. mean value and r.m.s value of alternating e.m.f., A.C circuit containing L-R, C-R and L-C-R, lag and lead of applied e.m.f and current reactance, impedance, susceptance , power in A.C. circuits, Wattless current, Electrical Resistance.

Suggested Books:
 1. Electricity & magnetism-K.K Tiwari (S.Chand)
 2. Electricity & magnetism-D.C Tayal (Himalaya Publishing Co)
 3. Electricity, magnetism & Electromagnetic Theory- S.Mahajan & Choudhury
 4. Electricity & magnetism:-Mochiram Das & et.al. (SriKrishna Publisher Cuttack)

B. Sc. IST GE-III Practical: Physics (Electrostatics, Electricity and Magnetism) Lab
Credits – 2, Full Marks – 25,

1.   Determination of Resistance using post-office box.

2.   Determination of Resistance using Meter Bridge.

3.   E.C.E of Copper by using Copper voltameter.

4.   To study the characteristics of p-n junction diode.

5.   Comparison of capacitance by De-sauty's Bridge.

6.   Refractive index of glass by using travelling microscope.

7.   Refractive index of water by using travelling microscope.

8.   Surface tension of water by weighing drop method.

B. Sc. IST CC V: Data Structure
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit I: Arrays- Single and Multi-dimensional Arrays, Sparse Matrices.

Stacks- Implementing single stack in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack.

Unit II: Linked Lists- Singly, Doubly and Circular Lists; Normal representation of stack in Lists; Skip Lists.

Queues- Queue, De-queue, Priority Queues.

Recursion- Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion.

Unit-III Tree-Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion , Recursive and Iterative Traversals on Binary Search Trees) Height-Balanced Trees(Various operations on AVL Trees).

Unit-IV: Searching and Sorting- Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Shell Sort, Comparison of Sorting Techniques

Hashing- Introduction to Hashing, Efficiency of Rehash Methods, Collision Hashing, Open Addressing, Separate Chaining, Extendible Hashing, Hash Function.

Reference Books:
1. Adam Drozdek, "Data Structures and algorithm in C++"*,* Third Edition, Cengage Learning, 2012.
2. SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++:, Second edition, PHI, 2009.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson,1999.
5. D.S Malik, Data Structure using C++,Second edition, Cengage Learning, 2010.
6. Mark Allen Weiss, *"*Data Structures and Algorithms Analysis in Java"*,* Pearson Education, 3rd edition, 2011
7. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using Java, 2003.
8. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub,2003
9. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited; 2 edition, 2009
10. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4th Edition, Wiley,2013
11. Herbert Schildt, "Java The Complete Reference (English) 9th Edition Paperback", Tata McGraw Hill, 2014.
13. A.K.Rath and A.K.Jagadev, ‒Data Structures Using C ‒Published by ECT Publication in 2004, Again Published by SCITECH Publicaton, 2007.
14. D. S. Malik, P.S. Nair, "Data Structures Using Java", Course Technology, 2003.
15. Khurana Rohit,‖Data and File Structure,(GTU),2e‖
16. Nag A,―Data Structures and Algotithms Using C,2e‖
17. Khurana Rohit, ‒Data Structures and OOP with C++(ANNA)‖
18. Khurana Rohit, ─ Data Structure Using C‖

19. Easwarakumar KS, ‒Object Oriented Data Structures Using C++‖

20. Chandrakanta Naikodi, ‒Programming in C and Data Structures (VTU) New‖

21. Litvin G, ‒Programming with C++ and Data Structures‖

22. Rout Susant K,‖ Tips and Tricks on Data Structures‖

23. Mark Allen Weiss,― Data Structure and algorithm Analysis in C‖.

24. Data Structures and Operating Systems. H.K. Gundurao, N.S. Manjunath, M.N. Nachappa. Himalaya publishing House.

25. Khurana, R. ‒Data Structures using C‖.

B. Sc. IST CC V Practical: Data Structures Lab
Credits – 2, Full Marks – 25,
(Students has to perform any 15 practical assignments as decided by the teachers)

1. Create a Single Linked List with n number of nodes of char type. Now reverse all the node's contents.
2. Create a double linked list of integers. Find out the largest and smallest number in the list. Swap the largest and smallest display the original list and the swapped list.
3. Separate the even and odd integer information nodes in single linked list.
4. Separate the vowels in a character list.
5. Create a stack and display until the Nth location from the top.
6. Insert an item in the Nth position in a stack.
7. Create a queue of size M and display it's contents. Now add N number of new items into the queue and display the queue with all of its contents including the new items.
8. Sort asset of numbers using ‖Quick Sort‖.
9. Sort asset of numbers using ‖Merge Sort‖.
10. Sort asset of numbers using ‖Heap Sort‖.
11. Sort asset of numbers using ‖Selection Sort‖.
12. Search a number in the sorted list using ‖binary search‖.
13. Search a number in the sorted list using linear search.
14. Prepare a mark sheet using structure concept of a C language. Find out the first rank.
15. Create a list of integers and display its contents. Insert a new node in the list at any position and displaying the list again.
16. Create a list of integers and display its contents. Delete a node in the list at any position and displaying the list again.
17. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
18. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
19. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
20. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
21. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
22. Perform Stack operations using Linked List implementation.
23. Perform Stack operations using Array implementation. Use Templates.
24. Perform Queues operations using Circular Array implementation. Use Templates.
25. Create and perform different operations on Double-ended Queues using Linked List implementation.
26. WAP to scan a polynomial using linked list and add two polynomial.
27. WAP to calculate factorial and to compute the factors of a given no. (i)using recursion, (ii)using iteration

28. WAP to display fibonacci series (i)using recursion, (ii) using iteration
29. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
30. WAP to create a Binary Search Tree and include following operations in tree:
(a)   Insertion (Recursive and Iterative Implementation)
(b)   Deletion by copying
(c)   Deletion by Merging
(d)   Search a no. in BST
(e)   Display its preorder, postorder and inorder traversals Recursively
(f)   Display its preorder, postorder and inorder traversals Iteratively
(g)   Display its level-by-level traversals

(h)   Count the non-leaf nodes and leaf nodes
(i)   Display height of tree
(j)   Create a mirror image of tree
(k)   Check whether two BSTs are equal or not
31.   WAP to convert the Sparse Matrix into non-zero form and vice-versa.
32.   WAP to reverse the order of the elements in the stack using additional stack.
33.   WAP to reverse the order of the elements in the stack using additional Queue.
34.   WAP to implement Diagonal Matrix using one-dimensional array.
35.   WAP to implement Lower Triangular Matrix using one-dimensional array.
36.   WAP to implement Upper Triangular Matrix using one-dimensional array.
37.   WAP to implement Symmetric Matrix using one-dimensional array.
38.   WAP to create a Threaded Binary Tree as per inorder traversal, and implement operations like finding the successor / predecessor of an element, insert an element, in order traversal.

B. Sc. IST CC VI: Communication Electronics
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit-I: Electronic communication: Block diagram of an electronic communication system, electromagnetic spectrum-band designations and applications, need for modulation, concept of channels and base-band signals. Concept of Noise, Types of Noise, Signal to noise ratio, Noise Figure, Noise Temperature, Friss formula.

Unit-II: Amplitude Modulation: Amplitude Modulation, modulation index and frequency spectrum. Generation of AM, Amplitude Demodulation (diode detector), Concept of Double side band suppressed carrier, Single side band suppressed carrier, other forms of AM (Pilot Carrier Modulation, Vestigial Side Band modulation, Independent Side Band Modulation). Block diagram of AM Transmitter and Receiver

Unit -III: Angle modulation: Frequency and Phase modulation, modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM (direct and indirect methods), FM detector (PLL). Block diagram of FM Transmitter and Receiver
Comparison between AM, FM and PM.

Unit -IV: Pulse Analog Modulation: Channel capacity, Sampling theorem, PAM, PDM, PPM modulation and detection techniques, Multiplexing, TDM and FDM.
Pulse Code Modulation: Need for digital transmission, Quantizing, Uniform and Non- uniform Quantization, Quantization Noise, Companding, Coding, Decoding, Regeneration.

Digital Carrier Modulation Techniques: Block diagram of digital transmission and reception, Information capacity, Bit Rate, Baud Rate and M-ary coding. Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK) and Quadrature Phase Shift Keying (QPSK)

Suggested Books:

1. Electronic communication systems- Kennedy, 3rd edition, McGraw international publications

2. Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill

3. Communication Systems, S. Haykin, Wiley India (2006)

4. Advanced electronic communications systems – Tomasi, 6th edition, PHI.

5. Communication Systems, S. Haykin, Wiley India (2006)

IST CC VI Practical: Communication Electronics Lab
(Hardware and Circuit Simulation Software)
Credits – 2, Full Marks – 25,

1. Study of Amplitude Modulation

2. Study of Amplitude Demodulation

3. Study of Frequency Modulation

4. Study of Frequency Demodulation

5. Study of Pulse Amplitude Modulation

6. AM Transmitter/Receiver

7. FM Transmitter/Receiver

8. Study of TDM, FDM

9. Study of Pulse Width Modulation

10. Study of Pulse Position Modulation

11. Study of Pulse Code Modulation

12. Study of Amplitude Shift Keying

13. Study of Phase Shift Keying,

14. Study of Frequency Shift Keying.

B. Sc. IST CC VII: Discrete Structures
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit -I: Introduction: Sets - finite and Infinite sets, uncountably Infinite Sets; functions, relations, Properties of Binary Relations, Closure, Partial Ordering Relations; counting - Pigeonhole Principle, Permutation and Combination; Mathematical Induction, Principle of Inclusion and Exclusion.

Unit -II: Growth of Functions: Asymptotic Notations, Summation formulas and properties, Bounding Summations, approximation by Integrals.

Unit -III: Recurrences: Recurrence Relations, generating functions, Linear Recurrence Relations with constant coefficients and their solution, Substitution Method, Recurrence Trees, Master Theorem.

Unit -IV: Graph Theory: Basic Terminology, Models and Types, multi graphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees.

Prepositional Logic-Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory

Recommended Books:

1. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd   Edition , Tata McGraw Hill, 1985,
2. Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition ,McGraw Hill 2006
3. T.H. Coremen, C.E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd edition Prentice Hall on India, 2009
4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988
5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
6. D.J. Hunter, Essentials of Discrete Mathematics, Jones and Bartlett Publishers, 2008
7. J.K. Mantri & T.K. Tripathy, Discrete Mathematics and Structure, Laxmi Publishers, New Delhi,2008.
8. Lyengar SN/Chandrasekaran VM/Venkatesh KA/Arunachalam PS, ─Discrete Mathematics‖

CCVII Practical: Discrete Structures Practical
Credits – 2, Full Marks – 25,

(Students has to perform any 7 practical assignments as decided by the concern faculty)

1. To generate Fibonacci series.
2. Sum of n-natural number using recursion.
3. Reverse a sentence using recursion.
4. Plotting of graphs of function e $^{ax+b}$, log(ax+b), sin (ax+b), cos(ax+b).
5. To calculate the value of ^{n}cr.
6. To calculate the value of ^{n}pr.
7. To generate all possible combination out of the letter a,b,c,d,e.
8. To find the edge connectivity of a graph.
9. To find whether a directed graph contains an Eularian path.
10. To check if a directed graph is a tree or not.
11. To count the number of leaf node in a tree.
12. To find the smallest and largest element in the Binary Search tree.
13. To traverse the tree recursively.
14. Write program to illustrate the DFS traversal of a graph.
15. Write a program to illustrate BFS traversal of a graph.
16. WAP To illustrate the basic operation (like insertion & deletion) on a heap tree.
17. WAP to illustrate various operations performed on binary search tree.

SEMESTER - IV

SEC- II: Structured Query Language (SQL)
Credits 2, Full marks -50 (10+40)

Unit-I

Getting started with SQL:
History of SQL & Database, Codd's rule, Overview of SQL, Popular SQL implements, ODBC, SQL in application programming.

Introduction to the Query:
General rules of syntax, building blocks of retrieve:
Select & from, changing order of columns, selecting individual columns, Queries with distinction.

Unit-II:

Expressions, Conditions & operators.

Unit-III:

Adding data with built in functions, Dates & Time in SQL.

Unit-IV:

Clauses in SQL queries.

Creating & maintaining tables, manipulating data.

Text Book:

(I)   SAMS Teach yourself SQL by Ryan K. Stephens and Ronald R.Plew (Tech Media Publication)

Reference Book:

(I)   Teach yourself SQL & PL/SQL using Oracle8i & 9i with SQLJ.

SEC- II: Python

Unit-I

Introduction[1], scripting language vs programming language[1], features of python[1],application domains of python, advantages, limitations/disadvantages[1], character set, tokens, identifiers, keywords[1], literals/constants, variables ,assigning values to variables, data types[3], indentation, multiline statements, quotations, comments[2]

Unit-II

Writing simple python programs, reading data from key board, direct input from user, converting data using casting function, eval() function , type conversion functions, int(), float(), complex(), bool()[3] , eval() function, converting int value, inverting float value, converting string value, converting complex value, converting bool value,[1]. Composite data types/collections/data structures, **string data structure:** string indexing, string slicing, string concatenation , string multiplication, string packing, string unpacking[3], string functions, capitalize(), title(), islower(), isupper(), lower(), upper(), len(),count(),find(),split(),lstrip(),rstrip(),strip(),swapcase(),reversed(),replace()[3]

Unit-III

Deleting a specific character, deleting a range of characters (del command), displaying strings in ascending order, descending order, string with space [1], **LIST Data structure:**

B. Sc. ISTGE IV:

Fundamentals of Management & Organizational Behaviour

(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Course Objective: To acquaint the students with the fundamentals of managing business and to understand individual and group behavior at work place so as to improve the effectiveness of an organization. The course will use and focus on Indian experiences, approaches and cases

Course contents:

Unit-I: Basic forms of Business Ownership; Special forms of ownership: Franchising, Licensing, Leasing; Choosing a form of Business ownership; Corporate Expansion: mergers and acquisitions, diversification, forward and backward integration, joint ventures, Strategic alliance.
Evolution of Management Theory. Managerial functions and Roles. Insights from Indian practices and ethos.

Unit-II: Overview of Planning: Types of Plans& The planning process; Decision making: Process, Types and Techniques. Control: Function, Process and types of Control; Principles of organizing: Common organisational structures; Delegation & Decentralization: Factors affecting the extent of decentralization, Process and Principles of delegation.

Unit-III:Importance of organizational Behaviour: Perception and Attribution: Concept, Nature, Process, Personality: Personality: Learning: Concept and Theories of Learning, reinforcement. Motivation: Concepts and their application, Need, Content & Process theories, Contemporary Leadership issues: Charismatic, Transformational Leadership. Emotional Intelligence

Unit-IV: Groups and Teams: Definition, Difference between Groups and teams; Stages of Group Development, Group Cohesiveness, Types of teams. Analysis of Interpersonal Relationship: Transactional Analysis, Johari Window.

Organisational Power and Politics: Nature of organisational politics. Conflict: Concept, Sources, Types, Stages of conflict, Management of conflict.

Organisational Change: Concept, Resistance to change, Managing resistance to change, Implementing Change, Kurt Lewin Theory of Change. Managing Stress: Insights from Indian ethos.

Suggested Books:
1. Gilbert: Principles of Management, McGraw Hill.
2. Greenberg Jerald and Baron Robert A.: Behaviour in Organisations: Understanding and Managing The Human Side of Work, Prentice Hall of India.
3. Kaul Vijay Kumar, Business Organisation & Management - Text and Cases, Pearson.
4. Kaul, Vijay Kumar, Management- Text & Cases, Vikas Publication.
5. Kavita Singh: Organisational Behaviour, Vikas Publication.
6. Koontz & Heinz Weihrich: Essential of Management, McGraw Hill.
7. Luthans Fred: Organisational Behaviour, Tata McGraw Hill.
8. Mc Shane L. Steven, Glinow Mary Ann Von & Sharma Radha R. - Organisational Behaviour; Tata McGraw Hill.
9. Newstrom John W.: Organisational Behaviour, Tata McGraw Hill.
10. Richard L. Daft: Principles of Management, Cengage Learning India.
11. Robbins Stephen P: Organisational Behaviour, Pearson.
12. Stephen P. Robbins & Mary Coulter: Management, Pearson.
13. Stoner &Wankel: Management, Prentice Hall of India.
14. Y.K. Bhushan: Fundamentals of Business Organisation & Management, Sultan Chand & Sons.
15. NavinMathur, Management Gurus , National Publishing House, New Delhi

B. SC. IST GE IV Practical:
Fundamentals of Management & Organizational Behaviour (Project)
Credits – 2, Full Marks – 25,

1.   Students have to complete one project/dissertation in the area of management (including general management and/or organizational behavior) under the guidance of a faculty member of concerned subject as decided by the HOD.

2.   The Project should be based on general management/organizational behavior /financial management/ human resource management/ marketing research /brand management/ advertising management/ marketing management/ sales management etc. OR as decided by the respective guide.

3.   The project work should start at the beginning of the 4th semester and the project report/dissertation should be submitted to the HOD concerned before the commencement of the 4th semester term end examination. However it should progress parally with the other theory and practical papers of 4th semester.

4.   The project report /dissertation should be evaluated by an external examiner and an internal examiner jointly   like other practical papers of generic elective.

B. Sc. IST CC VIII: Computer Networks
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit I:Introduction to Computer Networks-Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference   model; overview of TCP/IP protocol suite.

Unit II: Data Communication Fundamentals and Techniques-Analog and digital signal; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

Unit III: Networks Switching Techniques and Access mechanisms-Circuit switching; packet switching-connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

Unit IV: Data Link Layer Functions and Protocol-Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.
Multiple Access Protocol and Networks-CSMA/CD protocols; Ethernet LANS (Standard Ethernet) repeaters, hubs, switches, bridges, router and gateways.

Reference Books
1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM ,2007.
2. A. S. Tanenbaum: Computer Networks**,** Fourth edition**,** PHI , 2002
3. Rajesh RS/ Easwarakumar KS/Balasubramanian R, ― Computer Networks: Fundamentals & Applications‖
4. Agrawal R/ Tiwari BB,‖Data Communication and Computer Networks‖
5. Agrawal Rajneesh, ‒Data Communication and Networking‖

B. Sc. IST-CC VIII Practical: Computer Networks Lab
Credits – 2, Full Marks – 25,

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
2. Simulate and implement stop and wait protocol for noisy channel.
3. Simulate and implement go back n sliding window protocol.
4. Simulate and implement selective repeat sliding window protocol.
5. Simulate and implement distance vector routing algorithm
6. Simulate and implement Dijkstra algorithm for shortest path routing.
7. Establishing a LAN connection
8. Accessing data from other devices through LAN
9. Setting up a wireless network
10. Setting up a home network
11. Change Browser's security setting
12. Change proxy settings in Internet Explorer
13. Change TCP/IP settings
14. Set up a computer-to-computer (adhoc) network
15. HOTSPOT setting on desktop
16. Printer Sharing with Computer to computer network

B. Sc. IST CC - IX: Digital Signal Processing
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit- I: Discrete Time systems: Discrete sequences, Representation of DTS, LSI Systems. Define convolution sum, Auto-correlation and Cross-correlation, causality and stability

Unit- II: Z-Transform: Definition , ROC Properties, Inverse Z Transform by power series expansion and partial fraction method, Stability System function of Linear time invariant.
System Function: Discrete time Fourier transform and properties. Signal flow graph, It's use in representation of Discrete time systems. Properties of the Fourier Transform for Discrete time signals.

Unit- III: Discrete Fourier Transform: Discrete time Fourier, DFT and properties (Periodicity, Linearity, symmetry), circular convolution, Inverse of DFT, relationship with FT and z-Transform. FFT Algorithms, Radix-2 (DIT-FFT and DIF-FFT) Algorithms, IDFT using FFT Algorithms.

Unit IV: Digital Filters: Digital Filter: Analog filter review, system function for IIR and FIR filters, Network representation, IIR filter realization method and their limitations, FIR filter realization methods. Discrete correlation and convolution properties.

Suggested Books:

1. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.
2. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall, 1997.
3. P. Ramesh Babu, digital Signal Processing, Scitech Publications.

B. Sc. IST CC IX Practical: Digital Signal Processing
(Scilab/MATLAB/Other Mathematical Simulation software)
Credits – 2, Full Marks – 25,

1. Generation of unit sample sequence, unit step, ramp function, discrete time sequence, real sinusoidal sequence.
2. Generate and plot sequences over an interval.
3. Given x[n], write program to find X[z].
4. Fourier Transform, Discrete Fourier Transform and Fast Fourier Transform
5. Design of a Butterworth analog filter for low pass and high pass.
6. Design of digital filters.

B. Sc. IST CC X: Operating System
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit I:Introduction-Basic OS functions, types of operating systems–multiprogramming systems, batch systems , time sharing systems; operating systems for personal computers & workstations & real time systems.

Operating System Organization-Kernels, System Calls, System programs.

Unit -II: Process Management overview, process, and process state, PCB-Threads overview, threading issues, (Fork & exec() system call , cancellation, signal handling , Thread specificated, process scheduling, basic concept , non-pre-emptive and pre-emptive,Scheduling algorithms).
Critical section, semaphores usage, concept of interProcess communication, deadlocks (System model, necessary conditions, deadlock handling).

Unit -III: Memory Management-Physical and virtual address space; memory allocation strategies –fixed and variable partitions, Paging, (Basic method) segmentation, (Basic method) virtual memory.(Basic concept, Demand paging-basic concepts)

Unit -IV: File and I/O Management-Directory structure, (Storage structure, directory overview, single level, 2-level) file operations, files allocation methods.
Protection and Security-Authentication, Internal access Authorization.

Recommended Books:
1. A. Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8 Edition,
   John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd   Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2ndEdition Pearson Education 1997.

4. W. Stallings, Operating Systems, Internals & Design Principles, 5 India. 2008.Edition, Prentice Hall of

5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.
6. Rohit Khurana, ‒Operating System,2e‖ New Edition

B. Sc. IST CC X Practical: Operating Systems Lab
Credits – 2, Full Marks – 25,
(Students has to perform any 5 practical assignments using C/ C++ programs as decided by the concern faculty)

1. WRITE A PROGRAM (using *fork()* and/or *exec()* commands) where parent and child execute:
   a) same program, same code.
   b) same program, different code.

   c) before terminating, the parent waits for the child to finish its task.

2. WRITE A PROGRAM to report behaviour of Linux kernel including kernel version, CPU type and model. (CPU information)

3. WRITE A PROGRAM to report behaviour of Linux kernel including information on configured memory, amount of free and used memory. (memory information)

4. WRITE A PROGRAM to print file details including owner access permissions, file access time, where file name is given as argument.

5. WRITE A PROGRAM to copy files using system calls.

6. Write program to implement FCFS scheduling algorithm.

7. Write program to implement Round Robin scheduling algorithm.

8. Write program to implement SJF scheduling algorithm.

9. Write program to implement non-preemptive priority based scheduling algorithm.

10. Write program to implement preemptive priority based scheduling algorithm.

11. Write program to implement SRJF scheduling algorithm.

12. Write program to calculate sum of n numbers using *thread* library.

13. Write a program to implement first-fit, best-fit and worst-fit allocation strategies.

SEMESTER V

B. Sc. IST DSE-I: Embedded System Design
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit I: Introduction to Embedded Systems: Overview of Embedded Systems, Features, Requirements and Applications, Recent Trends in the Embedded System Design, Common architectures for the Embedded System Design, Embedded Software design issues.
Introduction to microcontrollers, Overview of Harvard architecture and Von Neumann architecture, RISC and CISC microcontrollers

Unit II: AVR RISC Microcontrollers: Introduction to AVR RISC Microcontrollers, Architecture overview, status register, general purpose register file, memories, Instruction set, Data Transfer Instructions, Arithmetic and Logic Instructions, Branch Instructions, Bit and Bit- test Instructions, MCU Control Instructions. Simple programs in Assembly Language / C Language

Unit III: Interrupts and Timer: Introduction to System Clock, Reset sources, Introduction to interrupts, External interrupts, IO Ports, 8-bit and 16-bit Timers, introduction to different modes, Input Capture and Compare Match.

Unit IV: Perpherals: Analog Comparator, Analog-to-Digital Converter, Serial Peripheral Interface (SPI), The Universal Synchronous and Asynchronous serial Receiver and Transmitter (USART), Two Wire Interface (TWI) / I^2C bus

Suggested Books:

1. AVR Microcontroller and Embedded Systems: Using Assembly and C by Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi, PHI
2. Embedded system Design - Frank Vahid and Tony Givargis, John Wiley, 2002
3. Programming and Customizing the AVR Microcontroller by D V Gadre, McGraw- Hill
4. Atmel AVR Microcontroller Primer: Programming and Interfacing by Steven F. Barrett, Daniel J. Pack, Morgan & Claypool Publishers
5. An Embedded Software Primer by David E Simon, Addison Wesley
6. AVR Microcontroller Datasheet, Atmel Corporation, www.atmel.com

B. Sc. IST DSE I Practical: Embedded Systems Design Lab
(Experiments to be performed on AVR trainer kit)
Credits – 2, Full Marks – 25,

1. Flash LED at an observable rate.

2. Hello LED – Flash LED at a rate such that the LED appears always on. Estimate the onset of the rate when the LED appears to stay on

3. Controlling ON/OFF of an LED using switch.

4. Use LFSR based random number generator to generate a random number and display it.

5. Toggle the LED every second using Timer interrupt.

6. Use the potentiometer to change the red LED intensity from 0 to maximum in 256 steps.

7. Use the switch to select the LED (from RGB led) and then the potentiometer to set the intensity of that LED and thus create your own color from amongst 16million colors.

8. Read the ADC value of the voltage divider involving the LDR. Print the value on the serial monitor.

9. Use the LDR and estimate a threshold for the LDR value and use that to turn the RGB LED on, to simulate an _automatic porch light'.

10. Use the thermistor to estimate the temperature and print the raw value on the serial monitor.

11. Connect the LCD I/O Board and print _Hello World' on the LCD. Scroll display from left to right.

12. Use the on-board EEPROM to store the temperature min and max values together with a time stamp.

13. Speed control of d.c. motor.

14. Speed control of stepper motor.

B. Sc. IST DSE II: Software Engineering
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)

<u>Theory</u>

Unit I: Introduction-The Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Engineering as a Layered Technology, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI).

Unit II: Requirement Analysis-Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling Need for SRS, Characteristics and Components of SRS.

Unit III: Software Project Management: Estimation in Project Planning Process, Project Scheduling.

Risk Management: Software Risks, Risk Identification, Risk Projection, RMMM Plan.
Quality Management: Quality Concepts, Software Quality Assurance, Software Reviews.

Unit IV: Design Engineering: Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level.

Testing Strategies & Tactics (8 Lectures) Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing.

Recommended Books:
1. R.S. Pressman, Software Engineering: A Practitioner‗s Approach (7th Edition), McGraw- Hill, 2009.
2. P. Jalote, An Integrated Approach to Software Engineering (2th Edition), Narosa Publishing House, 2003.
3. K.K. Aggarwal and Y. Singh, Software Engineering (2nd Edition), New Age International Publishers, 2008.

4. I. Sommerville, Software Engineering (8th edition), Addision Wesley,2006

5. D. Bell, Software Engineering for Students (4th Edition), Addison-Wesley, 2005.

6. R. Mall, Fundamentals of Software Engineering (2nd   Edition), Prentice-Hall of India, 2004.
7. Khurana Rohit, ‒Software Engineering: Principles and Practices, 2e‖
8. Khurana Rohit, ‒Software Engineering and Quality Assurance(ANNA)

B. Sc. IST-DSE II Practical: Software Engineering Lab
Credits – 2, Full Marks – 25,

Sl. No.	Practical Title
1.	• Problem Statement • Process Model
2.	Requirement Analysis • Creating a Data Flow • Data Dictionary, Use Cases
3	Project Management • Computing FP • Effort • Scheduled, Risk Table, Timeline chart
4	Design Engineering • Architectural Design • Data Design, Component Level
5.	Testing • Basis Path Testing

Sample Projects:

1. **Criminal Record Management**: Implement a criminal record management system for jailers, police officers and CBI officers
2. **DTC Route Information**: Online information about the bus routes and their frequency and fares
3. **Car Pooling**: To maintain a web based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.
4. Patient Appointment and Prescription Management System
5. Organized Retail Shopping Management Software
6. Online Hotel Reservation Service System
7. Examination and Result computation system
8. Automatic Internal Assessment System
9. Parking Allocation System
10. Wholesale Management System

B. Sc. IST CCXI: Microprocessor and Microcontrollers
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit-I: Introduction to Microprocessor: Introduction, Applications, Basic block diagram, Speed, Word size, Memory capacity, Classification of microprocessors (mention of different microprocessors being used)

Microprocessor 8085: Features, Architecture -block diagram, General purpose registers, register pairs, flags, stack pointer, program counter, types of buses. Multiplexed address and data bus, generation of control signals, pin description of microprocessor 8085. Basic interfacing concepts, Memory mapped I/O and I/O mapped I/O.

Unit-II: 8085 Instructions**:** Operation code, Operand & Mnemonics. Instruction set of 8085, instruction classification, addressing modes, instruction format. Data transfer instructions, arithmetic instructions, increment & decrement instructions, logical instructions, branch instructions and machine control instructions. Assembly language programming examples.
Stack operations, subroutine, call and return instructions. Delay loops, use of counters, timing diagrams- instruction cycle, machine cycle, T- states, time delay.

Unit III: Introduction to Microcontrollers: Basic block diagram, comparison of microcontroller with microprocessors, comparison of 8 bit, 16 bit and 32 bit microcontrollers.
MICROCONTROLLER 8051- architecture **-**internal block diagram, key features of 8051, pin diagram, memory organization, Internal RAM memory, Internal ROM. General purpose data memory, special purpose/function registers, external memory.

Unit-IV: 8051 Interrupts: Interrupts – IE, IP, time flag interrupts, serial port interrupt, external interrupts, reset, interrupt control, interrupt priority, interrupt destinations & software generated interrupts.

8051 Addressing modes and Instruction set: Addressing modes, immediate addressing, register addressing, direct and indirect addressing
Data transfer instructions, internal data move, external data move, code memory read-only data move, Push and Pop and data exchange instructions.
Logical Instructions, byte level logical operations, bit level logical operations, rotate and swap operations.
Arithmetic Instructions, flags, incrementing and decrementing, addition, subtraction, multiplication and division, decimal arithmetic, simple programs in assembly language.

Suggested Books:

1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S.Gaonkar - Wiley Eastern Limited- IV Edition.
2. Fundamentals of Microprocessor & Microcomputer: B. Ram—Danpat Rai Publications.
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. MCKinlay ‒The 8051 Microcontroller and Embedded Systems‖, 2nd Edition, Pearson Education 2008.
4. Muhammad Ali Mazidi, ‒Microprocessors and Microcontrollers‖, Pearson, 2006

B. Sc. IST CC XI Practical: Microprocessor and Microcontrollers Lab
Practical- 20 classes (2hour duration)
Credits – 2, Full Marks – 25,

8085 Assembly language programs:
1. Program to transfer a block of data.
2. Program for multibyte addition
3. Program for multibyte subtraction
4. Program to multiply two 8-bit numbers.
5. Program to divide a 16 bit number by 8 bit number.
6. Program to search a given number in a given list.
7. Program to generate terms of Fibonacci series.
8. Program to find minimum and maximum among N numbers
9. Program to find the square root of an integer.
10. Program to find GCD of two numbers.
11. Program to sort numbers in ascending/descending order.
12. Program to verify the truth table of logic gates.

8051 Microcontroller Programming

1. Program to find the sum of N 8-bit numbers.
2. Program to find largest of N numbers.
3. Program to find smallest of N numbers
4. Program to find whether the given data is palindrome.
5. Program to arrange the numbers in ascending order.
6. Interfacing of stepper motor and Rotating stepper motor by N steps clockwise/ anticlockwise with speed control.
7. LCD interfacing.
8. Speed control of DC motor using PWM (pulse delay to be implemented using timer.

B. Sc. IST CC XII: Database Management System
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit)

Unit-I Introduction- Characteristics of database approach, data models, database system architecture and data independence.
Entity Relationship(ER) Modeling- Entity types, relationships, constraints.

Unit II: Relation data model- Relational model concepts, relational constraints
Relational algebra, SQL queries(select, project, rename, set)

Unit III: Database design- Mapping ER/EER model to relational database, functional dependencies, Normal forms (up to BCNF).

Unit IV: File Structure and Indexing-Operations on files, File of Unordered and ordered records, overview of File organizations, (Introduction secondary storage devices), Indexing structures for files (Primary index, secondary index, clustering index), Multilevel indexing using B and B^+ trees

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.

2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002

3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill 2010

4. R. Elmasri, S. B. Navathe Dataase System Models, Language, Design and application Programming, 6th Edition, Pearson Education, 2013

5. Leon Alexis/ Leon Mathews, ─ Database Management Systems‖

B. Sc. IST CC XII Practical: Database Management Systems Lab

Practical: 20 Classes (2hours duration)
Credits – 2, Full Marks – 25,

Create and use the following database schema to answer the given queries.

EMPLOYEE Schema

Field	Type	NULL	KEY	DEFAUL T
Eno	Char(3)	NO	PRI	NIL
Ename	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	Yes	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES	FK	NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL

DEPARTMENT Schema

Field	Type	NULL	KEY	DEFAUL T
Dno	Integer	No	PRI	NULL
Dname	Varchar(50)	Yes		NULL
Location	Varchar(50)	Yes		New Delhi

Query List
1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than $2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don_t have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission.
12. Sort the data in descending order of Salary and Commission.
13. Query to display Name of all the employees where the third letter of their name is _A_.
14. Query to display Name of all employees either have two _R_s or have two _A_s in their name and are either in Dept No = 30 or their Manger_s Employee No = 7788.
15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.

16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
20. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with _J_, _A_ and _M_.

21. Query to display Name, Hire Date and Day of the week on which the employee started.

22. Query to display Name, Department Name and Department No for all the employees.

23. Query to display Unique Listing of all Jobs that are in Department # 30.

24. Query to display Name, Dept Name of all employees who have an _A_ in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
26. Query to display Name and Employee no. Along with their Manger_s Name and the Manager_s employee no; along with the Employees_ Name who do not have a Manager.
27. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns a commission.
28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100.
29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
30. Query to display the number of employees performing the same Job type functions.
31. Query to display the no. of managers without listing their names.
32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
33. Query to display Name and Hire Date for all employees in the same dept. as Blake.
34. Query to display the Employee No. And Name for all employees who earn more than the average salary.
35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T_.
36. Query to display the names and salaries of all employees who report to King.
37. Query to display the department no, name and job for all employees in the Sales department.

SEMESTER VI

B. Sc. IST DSE III: Computer Graphics
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit

Unit I: Introduction-Basic elements of Computer graphics, Applications of Computer Graphics.
Graphics Hardware-Architecture of Raster and Random scan display devices, input/output devices.

Unit II: Fundamental Techniques in Graphics-Raster scan line, circle and ellipse drawing, Polygon filling, line and polygon clipping algorithms, 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective).

Unit-III: Geometric Modeling-Representing curves & Surfaces.
Visible Surface Detection Methods: Classification of VSD Algorithms, Back-Face detection, Debth Buffer method, a Buffer Scanline method.

Unit IV: Surface rendering-Illumination and shading models.(Basic illumination models), Basic color models (Standard primaries and chromaticity diagram RGB model, YIQ model, CMY,HSV) and Computer Animation(Design of Animation, sequences, c-A functions, Raster Animation, C-A language).

Books Recommended:
1. J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice   2nd edition Publication Addison Wesley 1990.

2. D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.

3. D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
4. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill   2nd edition 1989.
5. Neete Nain, ─ Computer Graphics‖™
6. Singh PK/ Rajendra Kumar, ─Computer Graphics-(GBTU)‖

B. Sc. IST DSE III Practical: Computer Graphics Lab
Credits – 2, Full Marks – 25,

1.   Write a program to implement Bresenham‗s line drawing algorithm.

1. Write a program to implement mid-point circle drawing algorithm.

2. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.

3. Write a program to clip a polygon using Sutherland Hodgeman algorithm.
4. Write a program to apply various 2D transformations on a 2D object (use homogenous coordinates).

5. Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.

6. Write a program to draw Hermite/Bezier curve.

B. Sc. IST-DSE IV: PROJECT REPORT WITH VIVA AND SEMINAR
Full Marks - 100

Each sixth semester student has to complete one project (individually or as a team member) in any area of Information Science and Telecommunication detailed in the course curriculum under the guidance of a regular faculty of the concerned department as decided by the head of the department. However, a student may opt an industrial expert as co-guide with due approval from the head of the department if needed. The project work should be based on research /development/implementation of hardware / software etc. or any related area to create new knowledge in the area of Information Science and Telecommunication with consultation with the concern guide and due approval from the concerned HOD. The students will have to submit a project report/dissertation before the term end examination. Marks will be awarded based on the evaluation of project report/dissertation, viva and presentation. If students desire to do their project work in any industry/development firm/reputed training institutions/R & D centers etc, they may be permitted subject to fulfilling the all other criteria as mentioned above. They may utilize the vacations like X-mas, dashahara etc. including the sundays so that they can attend the theory classes as usual.

B. Sc. IST CC XIII: Modern Communication Systems
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit

Unit-I: Optical Communication: Introduction of Optical Fiber, Types of Optical Fibers and classification of optical Fibers with regard to number of mores and refractive index profiles. Guidance in Optical Fiber, Basic principles of Optical Sources and Detectors, Block Diagram of optical fiber communication system, optical power budgeting.
Why is fiber optics important? Attractive features of optical fibers. Application of optical fibers in telecommunication, imaging and sensing. Fiber optics for future. Basic laws in geometrical optics, Brewster angle, total internal reflection. Concept of coherence, temporal and spatial coherence, two beam interference, mach- zehnder Fiber Optic interferometer. Ray path and ray equation, one dimensional ray equation, ray paths in homogeneous & square law medium. Numerical apperture of optical fiber .

Unit-II: Optical Fiber: Propagation characteristics in step index Optical Fiber , wave equation, mode concept in fiber , scalar modes in weakly guiding approximation modal analysis of step index fiber , idea of modal field for linearly polarized(LPim) modes , mode cut off , condition , single mode fiber with modal field under Gaussian approximation . Attenuation in optical fibers, dispersion in optical fibers. Bandwidth and transmission characteristics from dispersion and attenuation.
Principle of lasers, Einstein's A, B coefficients, different classes of lasers, elementary idea about solid states, semiconductor, gas, molecular laser, doped insulated and tunable lasers. Properties of lasers and applications based on these properties, LED source, principle of LED, output characteristics of LEDs, different types of LEDs with application.

Unit-III: Cellular Communication: Concept of cellular mobile communication – cell and cell splitting, frequency bands used in cellular communication, absolute RF channel numbers (ARFCN), frequency reuse, roaming and hand off, authentication of the SIM card of the subscribers, IMEI number, concept of data encryption, architecture (block diagram) of cellular mobile communication network, CDMA technology, CDMA overview, simplified block diagram of cellular phone handset, Comparative study of GSM and CDMA, 2G, 3G and 4G concepts.

Unit-IV: Satellite communication: Introduction, need, satellite orbits, advantages and disadvantages of geostationary satellites. Satellite visibility, satellite system – space segment, block diagrams of satellite sub systems, up link, down link, cross link, transponders (C- Band), effect of solar eclipse, path loss, ground station, simplified block diagram of earth station. Satellite access, TDMA, FDMA, CDMA concepts, comparison of TDMA and FDMA, Satellite antenna (parabolic dish antenna), GPS-services like SPS & PPS.

Local area networks (LAN): Primary characteristics of Ethernet-mobile IP, OSI model, wireless LAN requirements-concept of Bluetooth, Wi-Fi and WiMAX.

Suggested Books:

1. Introdution to fiber optics (By Ghatak & Thyagarajan, Cambridge university press)

2. Fiber Optics (By: Gred Kaiser)
3. Optical Fiber and laser, principles and applications (By Anuradha De, New Age International Publisher)

4. Fundamentals of Fiber optics in Telecommunication and sensor systems (By Bishnu P .Pal (Editor))

5. W. Tomasi, Electronic Communication Systems: Fundamentals through Advanced, Pearson Education, 3rd Edition

6. Martin S. Roden, Analog & Digital Communication Systems, Prentice Hall, Englewood Cliffs, 3rd Edition

7. Modern digital and analog Communication systems- B. P. Lathi, 4th Edition   2009

Oxford University press

8. ThiagarajanVishwanathan, Telecommunication Switching Systems and Networks, Prentice Hall of India.

9. Theodore S. Rappaport, Wireless Communications Principles and Practice, 2nd Edition, Pearson Education Asia.

B. Sc. IST CC XIII: Modern Communication Systems Lab
Credits – 2, Full Marks – 25,

1. Modulation of LED and detection through Photo detector.

2. Calculation of the transmission losses in an optical communication system.

3. Study of architecture of Mobile phone.

4. Study of Satellite Communication System.

5. Study of Optical Fiber Communication System

B. Sc. IST CC XIV: Design and Analysis of Algorithms
(Credits: Theory-04, Practicals-02)
Full Marks: 75 (Midterm – 15+ End term – 60)
(Unit Wise question pattern- Answer one question from each Unit

Unit-I: Introduction-Basic Design and Analysis techniques of Algorithms

Algorithm Design Techniques-Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.

Unit II: Sorting Techniques-Elementary sorting techniques–Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques - Heap Sort, Quick Sort, Sorting in Linear Time -Radix Sort

Unit III: Searching Techniques- searching Techniques, Medians & complexity analysis.
Lower Bounding Techniques-Decision Trees
Balanced Trees-Red-Black Trees

Unit IV: Graphs-Graph Algorithms–Breadth First Search, Depth First Search and its Applications, Minimum Spanning Trees.
String Processing-String Matching.

Recommended Books:
1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithms, PHI, 3rd Edition 2009
2. Sarabasse& A.V. Gelder Computer Algorithm – Introduction to Design and Analysis,

   Publisher – Pearson 3rd Edition 1999

3. M.R. Kabat--Design & Analysis of Algorithms‖, PHI, 1st edition 2013.

B. Sc. IST CC XIV Practical: Design and Analysis of Algorithms Lab
Credit: 02, Full mark - 25

1. i. Implement Insertion Sort (The program should report the number of comparisons)
   ii. Implement Merge Sort(The program should report the number of comparisons)
2. Implement Heap Sort(The program should report the number of comparisons)
3. Implement Randomized Quick sort (The program should report the number of comparisons)
4. Implement Radix Sort
5. Create a Red-Black Tree and perform following operations on it:
   i.   Insert a node
   ii.   Delete a node
   iii. Search for a number & also report the color of the node containing this number.
6. Write a program to determine the LCS of two given sequences
7. Implement Breadth-First Search in a graph
8. Implement Depth-First Search in a graph
9. Write a program to determine the minimum spanning tree of a graph

   For the algorithms at S.No 1 to 3 test run the algorithm on 100 different inputs of sizes varying from 30 to 10.
10. Count the number of comparisons and draw the graph. Compare it with a graph of nlogn.