FULL–TIME DIPLOMA COURSE IN INFORMATION TECHNOLOGY

CURRICULAR STRUCTURE

AND

SYLLABI

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION

KOLKATA KARIGORI BHAVAN, 2ND FLOOR, 110 S N BANERJEE ROAD,
KOLKATA — 700 013

FOREWARD

The West Bengal State Council of Technical Education is presently offering twenty-five full-time diploma courses in 43 polytechnics affiliated to it, 42 in West Bengal and 1 in Tripura. The courses being: —

(i) Architecture,
(ii) Automobile Engineering,
(iii) Chemical Engineering,
(iv) Civil Engineering,
(v) Computer Science & Technology,
(vi) Computer Software Technology,
(vii) Electrical Engineering,
(viii) Electronics & Tele-Communication Engineering,
(ix) Food Processing Technology,
(x) Foot Wear Technology,
(xi) **Information Technology,**
(xii) Instrumentation Technology,
(xiii) Interior Decoration, Handicrafts & Furniture Design,
(xiv) Marine Engineering,
(xv) Mechanical Engineering,
(xvi) Medical Laboratory Technology,
(xvii) Metallurgical Engineering,
(xviii) Mine Surveying,
(xix) Mining Engineering,
(xx) Modern Office Practice & Management,
(xxi) Photography,
(xxii) Pharmacy,
(xxiii) Printing Technology,
(xxiv) Production Engineering, and,
(xxv) Survey Engineering.

The students coming out of these institutions find employment in the organised and unorganised sectors and forms backbone of the world of work. They find employment in the functional areas. However, the most important job functions include: production, quality control, installation, maintenance, servicing, marketing etc. In order to train manpower of desired quality and standards, it is essential to provide appropriate learning experiences to the students for developing requisite competencies in the respective disciplines.

The Curricular Structure and the relevant syllabi for the above mentioned disciplines were last revised in 1994. Development in the field of Science & Technology warranties revision and upgradation of the curriculum at all the three levels of Engineering & Technology Education, viz. the Degree level, the Diploma level and the ITI level. It is with this understanding that the West Bengal State Council of Technical Education took the decision in early 2002 to update the existing curricular structure and syllabi of the different full-time diploma programmes in vogue. Accordingly the Board of Studies of the Council took initiative. Upon the recommendation of the Board of Studies, the State Council in its meeting held on 2nd July 2002 adopted Curricular Structures for the Diploma Programmes in Engineering & Technology, Applied Arts & Crafts and Other Disciplines, to be implemented from the 2002-2003 academic session. These are in accordance to the "NORMS AND STANDARDS" of the All India Council of Technical Education.

MODE OF CURRICULAR PROGRAMME

A Fixed & Linear Semester Mode is introduced in lieu of the Fixed & Linear Annual Mode. The new Curricular Programme consists of three parts, each part consisting of two semesters. Each semester consists of at least 15 contact weeks excluding internal assessments, end-semester examinations, preparatory and other holidays.

Weekly Work Schedule

Instead of the present practice of 7 periods per full working day and 4 periods per Saturday @ 45 minutes per period, 8 periods per full working day and 4 periods per Saturday @ 50 minutes per period with the following schedule is introduced. The last two periods of every working day will be of 45 minutes duration.

FULL WORKING DAY

1st Period	2nd Period	3rd Period	4th Period	Recess	5th Period	6th Period	7th Period	8th Period
10:30	11: 20	12:10	13:00	13:50	14:20	15:10	16:00	16:45
—	—	—	—	—	—	—	—	—
11:20	12:10	13:00	13:50	14:20	15:10	16:00	16:45	17:30

SATURDAY

1st Period	2nd Period	3rd Period	4th Period
10:30	11: 20	12:10	13:00
—	—	—	—
11:20	12:10	13:00	13:50

TABLE 1 (A) & (B): WEEKLY PERIOD SCHEDULE

In the Part – I First Semester & Second Semesters, 36 & 40 periods are respectively allocated for students' instruction and 8 & 4 periods are respectively allocated for student centred activities; and, in each of the other four semesters, out of the total 44 periods in a week, 39 periods are allocated for student contact and 5 periods for student centred activities. This leads to the present 2900 instructional contact hours per three-year full-time diploma course instead of the old 2430 instructional contact hours per three year.

Item	Present Semester System	Past Annual System	AICTE Recommendations
Total Institutional Hours per Week	38⅓ Hours	31¾ Hours	40 Hours
Student Contact Hours in Formal Training per Week	30 – 32½ Hours	27 Hours	33 – 36 Hours
Student Centred Activities (Library, Guided Studies Etc.) per Week	4 - 6⅔ Hours	2¼ Hours	08 – 10 Hours

TABLE 2: COMPARISON OF WEEKLY WORK SCHEDULE

Generally, it is recommended that the sessional classes be scheduled in the second half of a day, allocating the theoretical classes in the first half.

DURATION OF PROGRAMME & ENTRY QUALIFICATION

The minimum duration of the full-time diploma programme will be three years after 10+ or entry qualifications as approved by the AICTE from time to time.

CURRICULAR COMPONENTS OF THE DIPLOMA PROGRAMMES IN ENGINEERING & TECHNOLOGY

The Diploma Programmes in Engineering & Technology shall consist of curricular component comprising courses in General Studies, Applied Sciences, Basic Courses, Interdisciplinary Courses, Applied Courses (Departmental Core), and, Specialised Courses (Electives).

General Studies

All disciplines shall contain courses in general studies and communication. These are related to *supervisory / management skills*. Further, development of *communication skills* appropriate to functions of technicians and also complementary to the main theme or disciplines of the respective programmes is considered. In addition, courses offered include areas of social and economic concern like *environmental protection*, energy conservation, productivity and quality, safety and entrepreneurial development. A general course on computer literacy and computer applications is essentially included.

Applied Sciences

Courses under Applied Sciences include *Mathematics*, *Physics* and *Chemistry*. Topics for these courses are chosen depending on their requirement for study of the Basic, Interdisciplinary and Applied Courses in Engineering & Technology, as well as to help the students to pursue higher level of studies in chosen areas.

Basic Courses in Engineering & Technology

Courses in basic Engineering & Technology include *Engineering Drawing*, *Workshop Practice*, *Engineering Mechanics* and *Strength of Materials*. These are necessary for all the disciplines as this will help in the study of the Interdisciplinary and Applied Courses in Engineering & Technology.

Interdisciplinary Courses in Engineering & Technology

Though not included in the recommendations of the AICTE, the State Council, on the recommendation of the Board of Studies, included this component, viz. the Interdisciplinary Courses in Engineering & Technology. In the present time, no discipline of Engineering & Technology can develop of its own, but with the knowledge & skill taken from allied disciplines. Even there are disciplines, which are itself interdisciplinary in nature, like Medical Laboratory Technology where knowledge of Medical Science is amalgamated with that of Electronics. This component is introduced to expose the students to these areas of interdependence. Examples of such courses are *"Elements of Electrical Engineering"* (Mechanical), *"Principles & Applications of Digital Electronics"* (Electrical), *"Design of Structure"* (Architecture), *"Computer Oriented Numerical Methods"* (Chemical), *"Instrumentation, Automatic Control & Microprocessor Application"* (Production) etc.

Applied Courses in Engineering & Technology (Departmental Core)

These form the core studies relevant to the specific discipline and are meant to develop competencies required by the profession. One of the courses would be essentially Project work, which is intended to provide opportunity for students to develop understanding of the interrelationship between courses and to apply the knowledge gained in a way that enables them to develop and demonstrate higher order skills. Project work has been given due weightage in terms of time and credit allocation. Industry-Institution-Interaction should be an integral component of curriculum wherever possible.

Specialised Courses in Engineering & Technology (Electives)

Courses under electives are offered to provide an avenue for limited specialisation in an area of the students' choice and should cover new and emerging areas. Examples of such courses are *"CAD CAM"* (Mechanical), *"Process Control & Instrumentation"* (Electrical), *"Water Resource Engineering"* (Civil), *"Alternative Building Technology"* (Architecture), *"PC Hardware Maintenance"* (Electronics & Tele-Communication Engineering) etc.

A summary of the new curricular structure for the Diploma Programmes in Engineering & Technology is illustrated below:

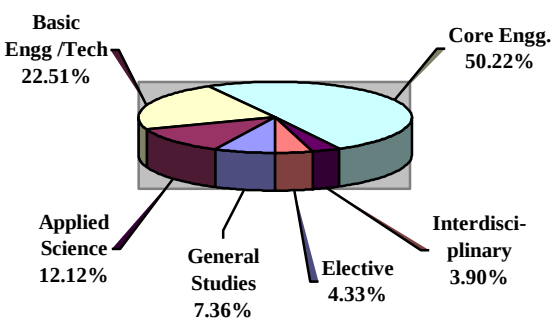

Fig. 3: Time Distribution of the Different Components of the New Curiculum

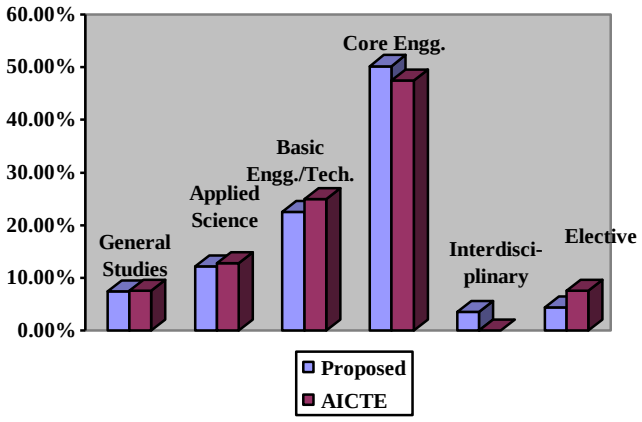

Fig. 4 : Comparison of Time Distribution of Different Components of the New Curriculum with that of the AICTE

COMPONENTS OF STUDY	Part – I 1ST SEM.	Part – I 2ND SEM.	Part – II 1ST SEM.	Part – II 2ND SEM.	Part – III 1ST SEM.	Part – III 2ND SEM.	TOTAL (%)	AICTE RECOMMEN-DATIONS
GENERAL STUDIES	03	04	03	04	03	—	17 (07.36%)	5 – 10 %
APPLIED SCIENCE	17	11	—	—	—	—	28 (12.12%)	10 – 15 %
BASIC ENGINEERING	16	24	12	—	—	—	52 (22.51 %)	20 – 30 %
APPLIED ENGINEERING (DEPT. CORE)	—	—	24	27	32	33	116 (50.22%)	40 – 55 %
INTERDISCIPLINARY	—	—	—	08	—	—	08 (03.46%)	—
SPECIALISED COURSES (ELECTIVE)	—	—	—	—	04	06	10 (04.33%)	5 – 10 %
TOTAL	**36**	**39**	**39**	**39**	**39**	**39**	**231 (100.00%)**	**—**

TABLE 5: SEMESTER WISE PERIOD ALLOCATION OF DIFFERENT COMPONENTS OF THE CURRICULAR STRUCTURE

Distribution of Marks

Taking the two semesters of each part together, the distribution of marks in the three parts for the theoretical and sessional papers will be as follows: —

PART	THEORETICAL	SESSIONAL	TOTAL
I	950	650	1600
II	1050	950	2000
III	1000	1000	2000
TOTAL	**3000**	**2600**	**5600**

TOTAL THEORETICAL MARKS : TOTAL SESSIONAL MARKS = 53.57 : 46.43

COMPONENTS OF THE CURRICULAR STRUCTURES FOR THE DIPLOMA COURSES IN APPLIED ARTS & CRAFTS AND OTHER DISCIPLINES

The curricular structures for the disciplines belonging to the "Applied Arts & Crafts" and "Other Disciplines" categories will have the same *'Mode of Curricular Programme'* and similar *'Distribution of Marks'* as those of the Engineering & Technology disciplines. But as per the AICTE Norms and Standards, the difference of the Curricular Structures will occur only in the percentage of time allocated towards the different curriculum components. These are illustrated in the detailed Curricular Structures of the respective disciplines.

THE METHODOLOGY OF REVISION & UPDATION

At the onset, the Board of Studies made the following policy decisions regarding formation of the syllabus sub-committees for preparation of the detailed curricular structure & syllabi of each discipline: —

(i) the convenors of each syllabus sub-committee are normally to be appointed from within the polytechnic system with certain exception;

(ii) on receiving recommendations from each convenor, the other members of the syllabus sub-committees are to be appointed and it has to be guaranteed that each syllabus sub-committee consisted of academicians from the universities / degree institutions, representatives from the concerned industries and the statutory councils (if any);

(iii) the syllabus sub-committees should first prepare the curricular structures and then they should prepare the detailed syllabi of the different courses;

(iv) along with the curriculum, the syllabus sub-committees should also mention the equipments and the technical personnel required for properly running the different Sessional classes (Drawing, Workshop, Laboratory, Project & Elective).

Upon scrutiny of the curriculum submitted by the different syllabus sub-committees and making modifications wherever necessary, the Board of Studies recommended the same to the West Bengal State Council of Technical Education for its consideration and formal adoption.

SYLLABUS SUB-COMMITTEES & RESOURCE PERSONS FOR SUBJECTS OFFERED AT PARTS – II & III

1. **SYLLABUS SUB-COMMITTEE FOR THE DISCIPLINE OF INFORMATION TECHNOLOGY:**
   (i) MEMBER-CONVENOR: SHRI SUDIP DUTTA, Lecturer in Computer Sc. & Tech., Calcutta Technical School;
   (ii) MEMBER: DR. SAMIRAN CHATTOPADHYAY, Professor & Head, Dept. of Information Technology, Jadavpur University;
   (iii) MEMBER: SHRI SUMAN SENGUPTA, Manager, Hi-Q Solution, Kolkata;
   (iv) MEMBER: SM. SARMILA ROY, Lecturer in Computer Sc. & Tech., Women's Polytechnic Jodhpur Park;
   (v) MEMBER: SHRI SWARUP KR. DAS, Lecturer in Computer Sc. & Tech., Calcutta Technical School;
   (vi) MEMBER: SHRI SANAT GHOSAL, Lecturer in Computer Sc. & Tech., Central Calcutta Polytechnic;
   (vii) MEMBER: SHRI ANIRUDDHA HALDER, Lecturer in Computer Sc. & Tech., Calcutta Technical School; and,
   (viii) MEMBER: SHRI PARTHA MANDAL, Lecturer in Computer Sc. & Tech., A.P.C. Roy Polytechnic.

2. **SYLLABUS SUB-COMMITTEE FOR "COMMUNICATION SKILLS (JOB)":**
   (i) MEMBER CONVENOR: SHRI SANKAR NATH GHOSH, formerly, Head of the Dept. & Lecturer in Humanities, Hooghly Institute of Technology;
   (ii) MEMBER: SHRI AMARESH KUMAR MUKHERJEE, formerly, Head of the Dept. & Lecturer in Humanities, Regional Institute of Printing Technology;
   (iii) MEMBER: SHRI PRABIR KUMAR GHOSH, Lecturer in Humanities, Central Calcutta Polytechnic;
   (iv) MEMBER: SM. PURNA BISWAS, Lecturer in Humanities, Women's Polytechnic, Jodhpur Park;
   (v) MEMBER: SHRI SANTANU MITRA, Lecturer in Humanities, J.C. Ghosh Polytechnic;
   (vi) MEMBER: SHRI HEMADRI CHATTERJEE, Lecturer in Humanities, R. K. Mission Silpapith, Belghoria;
   (vii) MEMBER: SM. SUKLA MITRA, formerly, English Studies Officer, British Council Division, Kolkata; and,
   (viii) MEMBER: SHRI SANTANU GOSWAMI, Manager Personnel & Industrial Relation Faculty, Exide Industries.

3. **SYLLABUS SUB-COMMITTEE FOR "BASIC ELECTRONICS":**
   (i) MEMBER-CONVENOR: SHRI SANDIP KUNDU, Lecturer in Electronics & Tele-Communication Engg., Women's Polytechnic, Chandannagar;
   (ii) MEMBER: SHRI SUJIT CHATTERJEE, Dy. General Manager, Transmission Maintenance, BSNL;
   (iii) MEMBER: SHRI JAYANTA MUKHOPADHYAY, Sr. Executive Engineer, Power Electronics Division, APLAB Limited;
   (iv) MEMBER: DR. BHASKAR GUPTA, Reader, Dept. of Electronics & Tele-Communication Engg., J.U.;
   (v) MEMBER: SHRI PIJUSH KANTI CHAKRABARTY, Lecturer in Electronics & Tele-Communication Engg., Women's Polytechnic, Jodhpur Park;
   (vi) MEMBER: DR. (SM.) BIJITA BISWAS, Lecturer in Electronics & Tele-Communication Engg., Women's Polytechnic, Jodhpur Park;
   (vii) MEMBER: SHRI NABENDU SENGUPTA, Lecturer in Electronics & Tele-Communication Engg., Birla Institute of Technology, Kolkata;
   (viii) MEMBER: DR. (SM.) MERINA DAN, Lecturer in Electronics & Tele-Communication Engg., EIJE, Dalalpukur, Howrah; and,
   (ix) MEMBER: SM. MANIDIPA ROY, Lecturer in Electronics & Tele-Communication Engg., Central Calcutta Polytechnic.

4. **SYLLABUS SUB-COMMITTEE FOR "INDUSTRIAL MANAGEMENT":**
   (i) MEMBER-CONVENOR: SHRI SOUMENDRA SEN, Asst. Director, Directorate of Technical Education & Training, Govt. of West Bengal;
   (ii) MEMBER: DR. P.K. DAN, Asst. Professor, IISWBM, Kolkata;
   (iii) MEMBER: SHRI APARESH C. BHATTACHARYYA, Member-Convenor, Syllabus Sub-Committee for the Discipline of Mechanical Engg., and, formerly, Sr. Manager (Pers. & Admn.), Jessop & Co. Ltd.;
   (iv) MEMBER: SHRI SUMON KUMAR ROY, Lecturer in Mechanical Engg., A.P.C. Roy Polytechnic, Kolkata;
   (v) MEMBER: SHRI A.C. MAJUMDAR, Part-time Lecturer, J.C. Ghosh Polytechnic.

4. **(A) RESOURCE PERSON FOR "INDUSTRIAL MANAGEMENT":** DR. NIKHIL RANJAN BANERJEA, General Manager (HRD), CESC.

5. **RESOURCE PERSONS FOR "ENVIRONMENTAL ENGINEERING":**
   (i) DR. NIKHIL RANJAN BANERJEA, General Manager (HRD), CESC; and,
   (ii) SHRI RABINDRA CHANDRA BHATTACHARYA, Vice-Chairman, WBSCTE.

6. **RESOURCE PERSON FOR "PROGRAMMING IN C":** SM. SARMILA ROY, Lecturer in Computer Sc. & Tech., Women's Polytechnic Jodhpur Park.

THE BOARD OF STUDIES

The members of the Board of Studies, under whose supervision and guidance the work of syllabus revision took place, are as follows: —

1.	**Chairman:**	DR. NIKHIL RANJAN BANERJEA, General Manager (HRD), CESC and Member, WBSCTE
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13.	**Member:**	SHRI DIPTENDU CHOWDHURY, Principal, Regional Institute of Printing Tech., Kolkata
14.	**Member:**	SM. LAHARI GHOSH, Principal, Birla Institute of Technology, Kolkata
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THE WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION

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1.	**Chairman:**	SHRI BANGSA GOPAL CHOWDHURY, MIC, Dept. of Technical Education & Training, Govt. of West Bengal
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5.	**Member:**	SHRI JAWHAR SARKAR, IAS, Secretary, Dept. of Science & Technology, Govt. of West Bengal
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12.	**Member:**	DR. SIDDHARTA DUTTA, Professor, Dept. of Chemical Engg., J.U.
13.	**Member:**	DR. MADHUSUDAN BHATTACHARYYA, formerly, Professor & Head, Dept. of Mechanical Engg., J.U.
14.	**Member:**	DR. SAMIRAN CHOWDHURY, Institution of Engineers (India)
15.	**Member:**	DR. SUJAN CHAKRABORTY, Member, Pharmacy Council of India
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21.	**Member:**	SHRI PRABIR KUMAR GHOSH, Lecturer in Humanities, Central Calcutta Polytechnic
22.	**Member:**	SHRI ALOKE MUKHERJEE, Lecturer in Electrical Engg., Birla Institute of Technology, Kolkata
23.	**Member:**	SHRI SANKAR PRASAD DEY, Workshop Instructor, Central Calcutta Polytechnic
24.	**Member:**	SHRI DEBESH DAS, Member of the Legislative Assembly, West Bengal
25.	**Member:**	SMT. KANIKA GANGULY, Member of the Legislative Assembly, West Bengal

Sd/-

R. K. SENGUPTA

SECRETARY

2nd July, 2004 **W. B. State Council of Technical Education**

CONTENTS

DETAILED CURRICULAR STRUCTURES OF THE THREE-YEAR FULL-TIME DIPLOMA COURSE IN INFORMATION TECHNOLOGY

CURRICULAR STRUCTURE FOR PART – I FIRST SEMESTER OF THE FULL-TIME DIPLOMA COURSES IN ENGINEERING & TECHNOLOGY

SL. NO.	SUBJECT CODE	SUBJECT OF STUDY	CONTACT PERIODS /WEEK			EXAMINATION SCHEME				FULL MARKS		PAGE NO.
						INTERNAL		EXTERNAL				
		THEORETICAL PAPERS	LECTURE	TUTORIAL	SESSIONAL	ASSESSMENT	ATTENDANCE	OBJECTIVE	SUBJECTIVE	TH.	SES.	
1.	* / 1 / T1 / CSS	COMMUNICATION SKILLS (STUDIES)	2	1	—	10	2	—	38	50	—	
2.	* / 1 / T2 / PHY1	PHYSICS – I	3	—	—	10	2	13	25	50	—	
3.	* / 1 / T3 / CHM1	CHEMISTRY – I	2	1	—	10	2	13	25	50	—	
4.	* / 1 / T4 / MTHS	MATHEMATICS	5	—	—	20	5	25	50	100	—	
5.	* / 1 / T5 / EMK	ENGINEERING MECHANICS	3	1	—	20	5	25	50	100	—	
6.	* / 1 / T6 / TD	TECHNICAL DRAWING (**4 HRS EXAM**)	—	—	—	20	5	25	50	100	—	
		SESSIONAL PAPERS	**LECTURE**	**TUTORIAL**	**SESSIONAL**	**INTERNAL**		**EXTERNAL**		**TH.**	**SES.**	**—**
7.	* / 1 & 2 / S1 / LPHY	PHYSICS LAB (GROUP – A)	—	—	3	12.5		—		—	—	
8.	* / 1 & 2 / S2 / LCHM	CHEMISTRY LAB (GROUP – A)	—	—	3	12.5		—		—	—	
9.	* / 1 & 2 / S3 / STD	TECHNICAL DRAWING (S)	—	—	6	50		50		—	100	
10.	* / 1 & 2 / S4 / WSPR	WORKSHOP PRACTICE	—	—	6	50		—		—	—	
*** Code for discipline**		**TOTAL**	**15**	**3**	**18**	**—**		—		**450**	**100**	—

CURRICULAR STRUCTURE FOR PART – I SECOND SEMESTER OF THE FULL-TIME DIPLOMA COURSES IN ENGINEERING & TECHNOLOGY

SL. NO.	SUBJECT CODE	SUBJECT OF STUDY	CONTACT PERIODS /WEEK			EXAMINATION SCHEME				FULL MARKS		PAGE NO.
						INTERNAL		EXTERNAL				
		THEORETICAL PAPERS	LECTURE	TUTORIAL	SESSIONAL	ASSESSMENT	ATTENDANCE	OBJECTIVE	SUBJECTIVE	TH.	SES.	
1.	* / 2 / T1 / BEA	BUSINESS ECONOMICS & ACCOUNTANCY	4	—	—	20	5	25	50	100	—	
2.	* / 2 / T2 / PHY2	PHYSICS – II	2	—	—	10	2	13	25	50	—	
3.	* / 2 / T3 / CHM2	CHEMISTRY – II	2	—	—	10	2	13	25	50	—	
4.	* / 2 / T4 / CAP	COMPUTER APPLICATIONS & PROGRAMMING	3	—	—	10	2	13	25	50	—	
5.	* / 2 / T5 / EMTH	ENGINEERING MATHEMATICS	3	—	—	20	5	25	50	100	—	
6.	* / 2 / T6 / SOM	STRENGTH OF MATERIALS	3	—	—	20	5	25	50	100	—	
7.	* / 2 / T7 / ETK	ELECTRICAL TECHNOLOGY	2	—	—	10	2	13	25	50	—	
8.	* / 2 / T8 / FCST	FUNDAMENTALS OF COMPUTER SCIENCE	4	2	—	20	5	25	50	100	—	
		SESSIONAL PAPERS	**LECTURE**	**TUTORIAL**	**SESSIONAL**	**INTERNAL**		**EXTERNAL**		**TH.**	**SES.**	**—**
9.	* / 1 & 2 / S1 / LPHY	PHYSICS LAB (GROUP – B)	—	—	2	12.5		25		—	50	
10.	* / 1 & 2 / S2 / LCHM	CHEMISTRY LAB (GROUP – B)	—	—	2	12.5		25		—	50	
11.	* / 1 & 2 / S3 / WSPR	WORKSHOP PRACTICE	—	—	6	50		100		—	200	
12.	* / 2 / S4 / LCAP	COMPUTER APPLICATIONS & PROGRAMMING LAB	—	—	3	50		50		—	100	
13.	* / 2 / S5 / LETK	ELECTRICAL TECHNOLOGY LAB	—	—	2	25		25		—	50	
*** Code for discipline**		**TOTAL**	**19**	**—**	**21**	**—**		—		**600**	**450**	—

CURRICULAR STRUCTURE FOR PART – II FIRST SEMESTER OF THE FULL-TIME DIPLOMA COURSE IN INFORMATION TECHNOLOGY

SL. NO.	SUBJECT CODE	SUBJECT OF STUDY	CONTACT PERIODS /WEEK		EXAMINATION SCHEME				FULL MARKS		PAGE NO.
					INTERNAL		EXTERNAL				
		THEORETICAL PAPERS	LECTURE	SESSIONAL	ASSESSMENT	ATTENDANCE	OBJECTIVE	SUBJECTIVE	TH.	SES.	
1.	IT / 3 / T1 / ENVE	ENVIRONMENTAL ENGINEERING	3	—	20	5	25	50	100	—	**7**
2.	IT / 3 / T2 / DMTH	DISCRETE MATHEMATICS	4	—	20	5	25	50	100	—	**9**
3.	IT / 3 / T3 / C	PROGRAMMING IN C	3	—	20	5	25	50	100	—	**10**
4.	IT / 3 / T4 / BET	BASIC ELECTRONICS	3	—	20	5	25	50	100	—	**12**
5.	IT / 3 / T5 / DLD	DIGITAL LOGIC DESIGN	4	—	20	5	25	50	100	—	**14**
6.	IT / 3 / T6 / CSA	COMPUTER SYSTEM ARCHITECTURE	4	—	20	5	25	50	100	—	**15**
		SESSIONAL PAPERS	**LECTURE**	**SESSIONAL**	**INTERNAL**		**EXTERNAL**		**TH.**	**SES.**	**—**
7.	IT / 3 / S1 / PCUL	PC UTILITY LAB	—	4	50		50		—	100	**17**
8.	IT / 3 / S2 / LC	PROGRAMMING IN C LAB	—	3	50		50		—	100	**17**
9.	IT / 3 / S3 / LBET	BASIC ELECTRONICS LAB	—	3	50		50		—	100	**19**
10.	IT / 3 / S4 / LDLD	DIGITAL LOGIC DESIGN LAB	—	4	50		50		—	100	**20**
11.	IT / 3 / S5 / BALC	BUSINESS APPLICATION LAB	—	4	50		50		—	100	**21**
		TOTAL	**21**	**18**	**—**		**—**		**600**	**500**	**—**

CURRICULAR STRUCTURE FOR PART – II SECOND SEMESTER OF THE FULL-TIME DIPLOMA COURSE IN INFORMATION TECHNOLOGY

SL. NO.	SUBJECT CODE	SUBJECT OF STUDY	CONTACT PERIODS /WEEK		EXAMINATION SCHEME				FULL MARKS		PAGE NO.
					INTERNAL		EXTERNAL				
		THEORETICAL PAPERS	LECTURE	SESSIONAL	ASSESSMENT	ATTENDANCE	OBJECTIVE	SUBJECTIVE	TH.	SES.	
1.	IT / 4 / T1 / CSJ	COMMUNICATION SKILLS (JOB)	2	—	10	2	—	38	50	—	**23**
2.	IT / 4 / T2 / DSC	DATA STRUCTURE	4	—	20	5	25	50	100	—	**24**
3.	IT / 4 / T3 / MPI	MICROPROCESSOR & ITS INTERFACING	4	—	20	5	25	50	100	—	**25**
4.	IT / 4 / T4 / OOP	OBJECT ORIENTED PROGRAMMING METHODOLOGY	4	—	20	5	25	50	100	—	**26**
5.	IT / 4 / T5 / EDC	ELECTRONICS DEVICE & CIRCUIT	3	—	20	5	25	50	100	—	**27**
		SESSIONAL PAPERS	**LECTURE**	**SESSIONAL**	**INTERNAL**		**EXTERNAL**		**TH.**	**SES.**	**—**
6.	IT / 4 / S1 / LCSJ	COMMUNICATION SKILLS (JOB) LAB	—	2	25		25		—	50	**29**
7.	IT / 4 / S2 / LDSC	DATA STRUCTURE LAB IN C	—	5	50		50		—	100	**30**
8.	IT / 4 / S3 / LMPI	MICROPROCESSOR LAB	—	5	50		50		—	100	**31**
9.	IT / 4 / S4 / LOOP	OBJECT ORIENTED PROGRAMMING LAB	—	5	50		50		—	100	**31**
10.	IT / 4 / S5 / LEDC	ELECTRONICS DEVICE & CIRCUIT LAB	—	5	50		50		—	100	**33**
		TOTAL	**17**	**22**	**—**		**—**		**450**	**450**	**—**

- Each of Part II – 1st & 2nd semester is of 17 weeks duration of which 15 weeks are scheduled as contact weeks and 2 weeks are scheduled for holding two Centralised Internal Assessments.
- Each of Part II – 1st & 2nd semester consists of 39 contact periods per week and 5 periods per week are allocated for Student Centred Activities like Library, Guided Studies etc.
- Marks distribution in Part – II : Theoretical – 1050, Sessional – 950; Total – 2000.

CURRICULAR STRUCTURE FOR PART – III FIRST SEMESTER OF THE FULL-TIME DIPLOMA COURSE IN INFORMATION TECHNOLOGY

SL. NO.	SUBJECT CODE	SUBJECT OF STUDY	CONTACT PERIODS /WEEK		EXAMINATION SCHEME				FULL MARKS		PAGE NO.
					INTERNAL		EXTERNAL				
		THEORETICAL PAPERS	LECTURE	SESSIONAL	ASSESSMENT	ATTENDANCE	OBJECTIVE	SUBJECTIVE	TH.	SES.	
1.	IT / 5 / T1 / IMNT	INDUSTRIAL MANAGEMENT	3	—	20	5	25	50	100	—	**37**
2.	IT / 5 / T2 / OS	OPERATING SYSTEMS	4	—	20	5	25	50	100	—	**38**
3.	IT / 5 / T3 / DM	DATABASE MANAGEMENT SYSTEM	4	—	20	5	25	50	100	—	**40**
4.	IT / 5 / T4 / POC	PRINCIPLE OF COMMUNICATION	4	—	20	5	25	50	100	—	**41**
5.	IT / 5 / T5 / AMTY	AUTOMATA THEORY	3	—	20	5	25	50	100	—	**42**
		SESSIONAL PAPERS	**LECTURE**	**SESSIONAL**	**INTERNAL**		**EXTERNAL**		**TH.**	**SES.**	**—**
6.	IT / 5 / S1 / ASWL	ADVANCED SOFTWARE LAB	—	5	50		50		—	100	**44**
7.	IT / 5 / S2 / LOS	OPERATING SYSTEMS LAB	—	4	50		50		—	100	**46**
8.	IT / 5 & 6 / S3 / ITPW	IT PROJECT WORK (GROUP – A)	—	4	50		—		—	—	**64**
9.	IT / 5 / S4 / LDM	DATABASE MANAGEMENT SYSTEM LAB	—	4	50		50		—	100	**47**
10.	IT / 5 / S5 / LPOC	PRINCIPLE OF COMMUNICATION LAB	—	4	50		50		—	100	**48**
		TOTAL	**18**	**21**	**—**		**—**		**600**	**300**	**—**

CURRICULAR STRUCTURE FOR PART – III SECOND SEMESTER OF THE FULL-TIME DIPLOMA COURSE IN INFORMATION TECHNOLOGY

SL. NO.	SUBJECT CODE	SUBJECT OF STUDY	CONTACT PERIODS /WEEK		EXAMINATION SCHEME				FULL MARKS		PAGE NO.
					INTERNAL		EXTERNAL				
		THEORETICAL PAPERS	LECTURE	SESSIONAL	ASSESSMENT	ATTENDANCE	OBJECTIVE	SUBJECTIVE	TH.	SES.	
1.	IT / 6 / T1 / CONW	COMPUTER NETWORKS	4	—	20	5	25	50	100	—	**49**
2.	IT / 6 / T2 / SYPR	SYSTEM PROGRAMMING	4	—	20	5	25	50	100	—	**51**
3.	IT / 6 / T3 / SWEN	SOFTWARE ENGINEERING	4	—	20	5	25	50	100	—	**52**
4.	IT / 6 / T4 / ADCM	ADVANCED COMMUNICATION	4	—	20	5	25	50	100	—	**54**
5.	IT / 6 / *T5 / CGR	COMPUTER GRAPHICS									**58**
6.	IT / 6 / *T6 / MMT	MULTIMEDIA TECHNOLOGY	3	—	20	5	25	50	100	—	**60**
7.	IT / 6 / *T7 / OR	OPERATION RESEARCH									**63**
		SESSIONAL PAPERS	**LECTURE**	**SESSIONAL**	**INTERNAL**		**EXTERNAL**		**TH.**	**SES.**	**—**
8.	IT / 6 / S1 / PMNL	PC MAINTENANCE & NETWORKING LAB	—	5	50		50		—	100	**55**
9.	IT / 6 / S2 / WTL	WEB TECHNOLOGY LAB	—	5	50		50		—	100	**56**
10.	IT / 5 & 6 / S3 / ITPW	IT PROJECT WORK (GROUP – B)	—	5	50		100		—	200	**64**
11.	IT / 6 / S4 / SMNR	SEMINAR ON IT PROJECT WORK	—	1	25		25		—	50	**64**
12.	IT / 6 / *S5 / LCGR	COMPUTER GRAPHICS LAB									**59**
13.	IT / 6 / *S6 / LMMT	MULTIMEDIA LAB	—	4	25		25		—	50	**61**
14.	IT / 6 / *S7 / LOR	OPERATION RESEARCH LAB									**64**
15.	IT / 6 / S8 / GVV	GENERAL VIVA VOCE	—	—	50		50		—	100	**66**
		TOTAL	**15**	**24**	**—**		**—**		**400**	**700**	**—**

- * Each student is required to opt for **any one of the following three elective papers** offered**:**
  (a) **COMPUTER GRAPHICS** (CGR, LCGR); (b) **MULTIMEDIA TECHNOLOGY** (MMT, LMMT). and, (b) **OPERATIONS RESEARCH** (OR, LOR).
- Each of Part III – 1st & 2nd semester is of 17 weeks duration of which 15 weeks are scheduled as contact weeks and 2 weeks are scheduled for holding two Centralised Internal Assessments.
- Each of Part III – 1st & 2nd semester consists of 39 contact periods per week and 5 periods per week are allocated for Student Centred Activities like Library, Guided Studies etc.
- Marks distribution in Part – III : Theoretical –1000, Sessional – 1000; Total – 2000.

DETAILED SYLLABI OF THE

DIFFERENT COURSES OFFERED IN

PART – II FIRST & SECOND SEMESTERS

ENVIRONMENTAL ENGINEERING

Subject Code	Course offered in	Course Duration	3 lecture contact periods	Full Marks
IT / 3 / T1 / ENVE	Part – II First Semester	17 weeks	per week	75

OBJECTIVE

Since the Rio-declaration, eco-friendly and sustainable development has become order of the day. Any individual involved with developmental work is expected to be aware of the environment and its related facets. The present course on "Environmental Engineering" is aimed at giving the students a comprehensive idea regarding the different interfaces of environmental pollution, which are — air, water, soil and noise pollution. On successful completion of the course they will also be aware of the different aspects of environmental management, viz. environmental legislations, authorities and systems.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	INTRODUCTION	2
	2	AIR POLLUTION	3
	3	ANALYSIS OF AIR POLLUTANTS	3
	4	AIR POLLUTION CONTROL MEASURES & EQUIPMENT	6
	5	METHODS & APPROACH OF AIR POLLUTION CONTROL	6
B	6	WATER SOURCES	2
	7	DIFFERENT SOURCES OF WATER POLLUTION	4
	8	EFFECT OF WATER POLLUTION & ITS CONTROL	4
C	9	SOIL POLLUTING AGENCIES & EFFECT OF SOIL POLLUTION	3
	10	SOLID WASTE DISPOSAL	4
D	11	NOISE POLLUTION & CONTROL	2
	12	ENVIRONMENTAL LEGISLATIONS, AUTHORITIES & SYSTEMS	6

CONTACT PERIODS: 45 **INTERNAL ASSESSMENT: 6** **TOTAL PERIODS: 51**

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3, 4, 5	15	ANY 25	ONE	1 x 25 = 25	FOUR	FIVE, TAKING AT LEAST ONE FROM EACH OF THE GROUPS A & B, AND, AT LEAST ONE FROM THE GROUPS C & D TAKEN TOGETHER	TEN	10 X 5 = 50
B	6, 7, 8	7				TWO			
C	9, 10	5				ONE			
D	11, 12	6				ONE			

DETAIL COURSE CONTENT

GROUP – A AIR & ENVIRONMENT 20 PERIODS

Module 1 INTRODUCTION **2**

Man & Environment: Overview (socio-economic structure & occupational exposures) – Scope of Environmental Engineering – pollution problem due to urbanisation & industrialisation

Module 2 AIR POLLUTION **3**

Causes of air pollution – types & sources of air pollutants – Climatic & Meteorological effect on air pollution concentration – formation of smog & fumigation

Module 3 ANALYSIS OF AIR POLLUTANTS **3**

Collection of Gaseous Air Pollutants – Collection of Particulate Pollutants – Analysis of Air Pollutants like: Sulphur dioxide – Nitrogen oxide – Carbon monoxide – Oxidants & Ozone – Hydrocarbons – Particulate Matter

Module 4 AIR POLLUTION CONTROL MEASURES & EQUIPMENT 6

Control of Particulate Emission – Control of Gaseous Emission – Flue Gas Treatment Methods: Stacks Gravitational and Inertial Separation, Settling Chambers, Dynamic Separators, Cyclones, Filtration, Liquid Scrubbing, Spray Chambers, Packed Towers, Orifice and Venturi Scrubbers, Electrostatic Precipitators, Gas/solid Adsorption, Thermal Decomposition

Module 5 METHODS & APPROACH OF AIR POLLUTION CONTROL 6

Controlling smoke nuisance — Develop air quality criteria and practical emission standards — creating zones suitable for industry based on micrometeorology of air area — Introducing artificial methods of removal of particulate and matters of waste before discharging to open atmosphere

GROUP – B WATER & ENVIRONMENT 10 PERIODS

Module 6 WATER SOURCES 2

Origin of wastewater — Type of water pollutants and their effects

Module 7 DIFFERENT SOURCES OF WATER POLLUTION 6

Biological Pollution (point & non-point sources) – Chemical Pollutants: Toxic Organic & Inorganic Chemicals – Oxygen demanding substances – Physical Pollutants: Thermal Waste – Radioactive waste – Physiological Pollutants: Taste affecting substances – other forming substances

Module 8 WATER POLLUTION & ITS CONTROL 2

Adverse effects on: Human Health & Environment, Aquatic life, Animal life, Plant life — Water Pollution Measurement Techniques – Water Pollution Control Equipments & Instruments – Indian Standards for Water Pollution Control

GROUP – C SOIL & ENVIRONMENT 7 PERIODS

Module 9 SOIL POLLUTING AGENCIES & EFFECT OF SOLUTION 3

Liquid & Solid Wastes – Domestic & Industrial Wastes – Pesticides – Toxic: Inorganic & Organic Pollutants – Soil Deterioration – Poor Fertility, Septicity, Ground Water Pollution, Concentration of Infecting Agents in Soil

Module 10 SOLID WASTE DISPOSAL 4

Dumping domestic & Industrial Solid Wastes: Advantages & Disadvantages – Incineration: Advantages & Disadvantages – Sanitary Land Field: Advantages & Disadvantages – Management of Careful & Sanitary Disposal of Solid Wastes

GROUP – D NOISE & ENVIRONMENTAL MANAGEMENT SYSTEM 8 PERIODS

Module 11 NOISE POLLUTION & CONTROL 2

Noise Pollution: Intensity, Duration – Types of Industrial Noise – Ill effects of Noise – Noise Measuring & Control – Permissible Noise Limits

Module 12 ENVIRONMENTAL LEGISLATIONS, AUTHORITIES & SYSTEMS 6

Air & Water Pollution Control Acts & Rules (Salient Features only) – Functions of State / Central Pollution Control Boards – Environmental Management System: ISO 14 000 (Salient Features only)

REFERENCE BOOKS

1. Concept of Ecology / Kormondy / Prentice Hall of India, New Delhi
2. Fundamental of Ecology / Odum
3. Environmental Science / J. Turk & A. Turk
4. Human Rights – A Source Book Eds. / R. Dev & S. Das / NCERT
5. Environmental Pollution / Dix
6. Pollution Control Acts, Rules and Notification / Central Pollution Control Board, New Delhi

DISCRETE MATHEMATICS

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 3 / T2 / DMTH	Part – II First Semester	17 weeks	per week	75

OBJECTIVE

With this subject students would be familiar with the matrix algebra, set theory and counting theory, which will help to develop the analytical and logical sense. This subject also includes graph theory, which has vast application in computer science.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	SET THEORY	15
	2	MATRIX THEORY	16
B	3	COUNTING TECHNIQUES	14
	4	GRAPH THEORY	15

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2	14	ANY 25	ONE	1 x 25 = 25	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	3, 4	14				FOUR			

DETAIL COURSE CONTENT

GROUP – A 31 PERIODS

Module 1 SET THEORY 15

1.1 CONCEPT OF SETS: Notation – Subset – Superset – Empty set – Universal set – Examples — OPERATION ON SETS: Union – Intersection – Complementation – Difference – Symmetric difference – Problems relating simple set identities – Definition of power set – Cartesian product of finite number of sets – Simple problems – Cardinality of a set – Finite and infinite sets

1.2 RELATION BETWEEN TWO SETS: Binary relation as a subset of Cartesian product – Reflexive, symmetric & transitive relations – Examples — Equivalence relation – Examples – Partition – problems

1.3 FUNCTIONS: Definition of function – Domain, Co-domain & Range of a function – Injective, Surjective and Bijective functions – Related problems

Module 2 MATRIX THEORY 16

2.1 ELEMENTARY TRANSFORMATION ON A MATRIX: Equivalent matrices – Definition of sub-matrix of a matrix – Rank of a matrix (definition) – Echelon form of a matrix – Theorems on rank (statement only) – Evaluation of rank of a matrix – Problems

2.2 ADJOINT of a square matrix – Definition of INVERSE of a matrix – Uniqueness of the inverse – Theorems on inverse of matrices – Problems

2.3 System of SIMULTANEOUS LINEAR EQUATIONS – Test of consistency – Solution of system of simultaneous linear equations by matrix method – Problems

2.4 Definition of EIGEN – Values and eigenvectors – Characteristic equation – Theorems on eigenvalues and eigenvectors – Related problems

GROUP – B 29 PERIODS

Module 3 COUNTING TECHNIQUES 14

3.1 PRINCIPLE OF INCLUSION AND EXCLUSION: Statement of the principle – Set theoretic problems relating to principles of inclusion and exclusion

3.2 MATHEMATICAL INDUCTION: Concept of Induction – Statement of the principle of Mathematical Induction – Application of the principle of Induction in various problems

3.3 RECURRENCE RELATION: Definition – Examples (Fibonacci series etc.) – Linear recurrence relations with constants coefficients – Homogeneous solutions – Particular solutions – Total solutions – Problems

Module 4 GRAPH THEORY 15

4.1 Introduction – Definition of a graph – Subgraph – Isomorphism – Walk, Paths and Circuits – Connectedness and components – Euler graphs – Hamiltonian paths and Circuits – Problems

4.2 TREE: Definition & properties of trees – Distance & centre in a tree – Rooted & binary trees – Spanning tree – Spanning tree in a weighted graph – Problems

4.3 Graph theoretic algorithms – Minimal Spanning tree algorithm – Shorted path algorithm.

REFERENCE BOOKS

1. Foundation of Discrete Mathematics / K. D. Joshi
2. Discrete Mathematics with Algorithms / Albertson & Hutchinson / John Wiley
3. Discrete Mathematics / Iyenger, Venkatesh, Chandrasekaran & Arunachalam / Vikash Publishing House
4. Discrete Structure and Graph Theory / S.K.S. Rathore and H. Chaudhuri / Everest Publishing House
5. Graph Theory with Application to Engineering and Computer Science / Narsingh Deo / Prentice Hall of India, N. Delhi

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PROGRAMMING IN C

Subject Code	Course offered in	Course Duration	3 lecture contact periods	Full Marks
IT / 3 / T3 / C	Part – II First Semester	17 weeks	per week	75

OBJECTIVE

This course is designed to have the students become competent in writing C program. Upon successful completion of this course the students will be able to: —

(i) use data types, operators and expressions in writing C program;
(ii) use function, external variables, multiple source files and also pre-processing;
(iii) employ the standard library in developing C program;
(iv) use arrays, structure, unions and pointers and organize data;
(v) use file accessing functions comfortably.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	INTRODUCTION TO PROGRAMMING	2
	2	OVERVIEW OF C PROGRAMMING	3
	3	TYPES, OPERATORS & EXPRESSIONS	5
	4	MANAGING INPUT & OUTPUT OPERATIONS	4
	5	CONTROL FLOW (DECISION MAKING)	6
B	6	ARRAYS	6
	7	USER DEFINED FUNCTION	6
	8	STRUCTURE & UNIONS	4
	9	POINTERS	6
	10	FILE HANDLING IN C	3

CONTACT PERIODS: 45 INTERNAL ASSESSMENT: 6 TOTAL PERIODS: 51

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3, 4, 5	15	ANY 25	ONE	1 X 25 = 25	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	6, 7, 8, 9, 10	17				FIVE			

DETAIL COURSE CONTENT

GROUP - A 20 PERIODS

Module 1 INTRODUCTION TO PROGRAMMING 2

Concept of program — Different programming languages & programming logic — Algorithms & Flow-charts

Module 2 OVERVIEW OF C PROGRAMMING 3

Introduction of C language — History of C — Importance of C — Demerits of C — Basic structure of C — Working steps of C Compiler — Source Code — Object code — Executable code

Module 3 TYPES, OPERATORS & EXPRESSIONS 5

Introduction (Grammars/Syntax Rules) — Character sets — Key words and Identifiers — Constants — Variables — Data types and Sizes — Declaration of variables — Different operators and expressions — Type conversions

Module 4 MANAGING INPUT & OUTPUT OPERATIONS 4

Analysis of some Input as well as Output functions: scanf ( ) – printf ( ) – getchar ( ) – putchar ( ) — Formatted Input and Output statements

Module 5 CONTROL FLOW (DECISION MAKING) 6

Decision making and branching — Simple and nested IF statements — IF-ELSE statements — CASE-SWITCH statements — Looping concept — GOTO statement — Looping: FOR, WHILE and DO-WHILE statements – Comparative study among them — BREAK and CONTINUE statements

GROUP - B 25 PERIODS

Module 6 ARRAYS 6

One and two dimensional array — Array initialisation — Handling of character strings by using Array — Concatenation and comparisons of strings — String handling functions

Module 7 USER DEFINED FUNCTIONS 6

Concept of user defined function — Difference between library function and user defined Function — Parameter passing technique — Calling a function — Category of function and their study —Nesting of functions and Recursions — Scope and lifetime of variables in functions

Module 8 STRUCTURE & UNION 4

Structure and Union — Declaration and initialisation — Array of structure

Module 9 POINTERS 6

Pointer declaration and accessing variables through pointers — Pointers and Arrays — Strings

Module 10 FILE HANDLING IN C 3

Different types of files — Command line arguments

REFERENCE BOOKS

1. PROGRAMMING WITH C / Byron Gottfried / Tata McGraw-Hill
2. PROGRAMMING IN ANSI C / E. Balagurusamy / Tata McGraw-Hill
3. LET US C / Y. Kanetkar / BPB
4. THINKING IN C / P.B. Mahapatra / Wheelers
5. THE C LANGUAGE TRAINER WITH C GRAPHICS AND C++ / J. Jayasri / New Age International
6. A FIRST COURSE IN PROGRAMMING WITH C / T. Jeyapoovan / Vikash Publishing House

BASIC ELECTRONICS

Subject Code	Course offered in	Course Duration	3 lecture contact periods	Full Marks
IT / 3 / T4 / BET	Part – II First Semester	17 weeks	per week	75

OBJECTIVE

This subject is introduced to make the students familiar with basic electrical and electronic components and also with some basic measuring instruments. Upon successful completion of this course the students will be able to: —

(i) list out the classes of resistors, capacitors and inductors;
(ii) be familiar with transformer, relays, switches and connectors,
(iii) understand the basic functions of zener diode, transistors, thyristor and simple opto-electronics devices.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	PASSIVE & ACTIVE CIRCUIT ELEMENTS	10
	2	TRANSFORMER	3
	3	RELAYS, SWITCHES, CABLES AND CONNECTORS	7
B	4	ZENER DIODE	3
	5	BIPOLAR TRANSISTOR	7
	6	FIELD EFFECT TRANSISTOR	5
C	7	UNIJUNCTION TRANSISTOR	2
	8	THYRISTOR	3
	9	OPTOELECTRONICS	3
	10	INTEGRATED CIRCUITS	2

CONTACT PERIODS: 45 **INTERNAL ASSESSMENT: 6** **TOTAL PERIODS: 51**

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	13	ANY 25	ONE	1 x 25 = 25	THREE	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	TEN	10 X 5 = 50
B	4, 5, 6	13				THREE			
C	7, 8, 9, 10	7				THREE			

DETAIL COURSE CONTENT

GROUP – A 20 PERIODS

Module 1 PASSIVE & ACTIVE CIRCUIT ELEMENTS 10

Familiarity with the following components: —

1.1 RESISTORS: Fixed and variable – Carbon & wire wound – Metal film & metal oxide – Thermistors – LDR and VDR (colour coding, power rating, accuracy and effect on temperatures, uses of resistors)
1.2 FUSES: Ordinary fuses (specifications)
1.3 CAPACITORS: Mica – Ceramic – Paper – Electrolytic – Tantalum – Silvered mica & power factor improving capacitors – Variable capacitors – Colour coding – Rating and uses of capacitors
1.4 INDUCTOR: Ferrite core – Pot core – Air core – Fixed, tapped and variable inductors – Factors affecting inductance and uses of inductors
1.5 Voltage source and current source
1.6 AC and DC signals

Module 2 TRANSFORMER 3

Elementary idea of transformer — Features and specifications of wideband transformer — RF and AF transformer.

Module 3 RELAYS, SWITCHES, CABLES & CONNECTORS 7

Familiarity with following components: —

3.1 RELAY: Reed relay & solid state relays – Their characteristics, specifications and applications

3.2 CABLES: RF cables – High temperature cables – Low impedance cables – TV and telephone line cables – Their characteristics and specifications

3.3 MANUALLY OPERATED SWITCHES: Toggle switch – Keyboard switch – Push-button switch – Rotary switch – Thumb-wheel switch – Cross-bar multi switch – Their features and applications

3.4 CONNECTORS: Plugs and sockets – RF connectors – Edge connectors for PCB – Rating and specifications of connectors – Factors affecting choice of connectors – Choice of connectors for different applications

GROUP – B 15 PERIODS

Module 4 ZENER DIODE 3

BREAKDOWN: Zener and avalanche – Construction of Zener diode and operation of Zener diode in reverse biased condition – Characteristics and equivalent circuits, specifications – Simple voltage regulator circuit

Module 5 BIPOLAR TRANSISTOR 7

5.1 Construction and operation of NPN and PNP transistors-V-I characteristics, transistor in active, saturation and cut-off-CE, CB, CC configuration and their differences, definitions of current gains and their relationship.

5.2 Transistor as simple amplifier & oscillator and their simple application

Module 6 FIELD EFFECT TRANSISTOR 5

6.1 Construction, operation and VI characteristics of JFET, pinch-off voltage, drain résistance, transconductance, amplification factor and their relationship

6.2 Enhancement and depletion type MOSFET- concepts of CMOS

6.3 Differences between BJT and JFET

GROUP – C 10 PERIODS

Module 7 UNIJUNCTION TRANSISTOR 2

Construction, operation and characteristics of UJT – Equivalent circuit – UJT as relaxation oscillator – Field of applications

Module 8 THYRISTOR 3

Construction, operation and characteristics of SCR – Turn on and turn off mechanism – SCS, DIAC, TRIAC and their uses

Module 9 OPTOELECTRONICS 3

Elementary ideas of LED, LCD, photodiode, phototransistor and solar cell and their applications

Module 10 INTEGRATED CIRCUITS 2

Basic idea of ICs – Classifications: linear and digital ICs, SSI, MSI, LSI and VLSI – field of applications

REFERENCE BOOKS

1. Electronic Principle / A.P. Malvino / Tata McGraw-Hill
2. Electronic Devices & Circuits / Millman & Halkias / Tata McGraw-Hill
3. Basic Electronics & Linear Circuits / Bhargava / Tata McGraw-Hill
4. Electronic devices & Circuit Theory / Boylestad & Nashalsky / PHI
5. Electronic Fundamentals & Applications / D. Chattopadhyay & P.C. Rakhshit / New Age International
6. Electronic Components and Materials / Madhuri A Joshi / Wheeler Publishers
7. Electronic Component / Padmanaban
8. Electronic Component / Ramchander
9. Electronic Measurement and system / R.G. Gupta / Tata McGraw-Hill

DIGITAL LOGIC DESIGN

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 3 / T5 / DLD	Part – II First Semester	17 weeks	per week	75

OBJECTIVE

This subject is basically designed to introduce the students with various components of digital circuits. It also develops the skill of designing the circuits.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	NUMBER SYSTEM & CODE	08
	2	BOOLEAN ALGEBRA & LOGIC GATES	08
B	3	SIMPLIFICATION OF LOGIC EXPRESSIONS	08
	4	COMBINATIONAL LOGIC CIRCUITS	15
C	5	SEQUENTIAL CIRCUITS	15
	6	DATA CONVERTER	06

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2	9	ANY 25	ONE	1 x 25 = 25	THREE	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	TEN	10 X 5 = 50
B	3, 4	13				THREE			
C	5, 6	11				THREE			

DETAIL COURSE CONTENT

GROUP – A 16 PERIODS

Module 1 NUMBER SYSTEMS & CODE 8

Simple arithmetic using positive and negative binary numbers: Addition, Subtraction, Division — Different Weighted & Non-weighted codes — Error correcting codes

Module 2 BOOLEAN ALGEBRA & LOGIC GATES 8

Definition of Boolean Algebra — Boolean Theorems (with their proofs) — Standard forms of expression & their conversion from one to another — LOGIC GATES: AND, OR, NOT, NAND, NOR, XOR, XNOR (truth table, logic expression, symbol) — Simple logic circuits using these gates

GROUP – B 23 PERIODS

Module 3 SIMPLIFICATION OF LOGIC EXPRESSIONS 8

Simplification of Boolean expression or logic expression using — (i) Boolean Algebra; (ii) Karnaugh Maps & (iii) Quine Maclusky Method

Module 4 COMBINATIONAL LOGIC CIRCUITS 15

Arithmetic Circuits: Half adder – Full adder – Half subtractor – Full subtractor (truth table, logic expression, equivalent circuit diagram – brief description) — Comparator – Multiplexer – Demultiplexer / Decoder – Code Converter – Encoder – Parity Generator & Checker

GROUP – C 21 PERIODS

Module 5 SEQUENTIAL CIRCUITS 15

Introduction to sequential circuits — Model of sequential circuits: latch & flip flops – timing parameters of latch & flip flops – conversion of one flip flop to another — COUNTER: Introduction to counter – Binary ripple counter (UP/DOWN) – Module-n-counter – Synchronous & Asynchronous counter — REGISTERS: Shift registers – Serial data – Parallel data – Design of registers & their functional detail.

Module 6 DATA CONVERTER 6

DIGITAL TO ANALOG CONVERTER (DAC): Weighted register ladder, Commercially Available DAC — ANALOG TO DIGITAL CONVERTER (ADC): Different types – Successive approximation – Dual – Slope type – ADC performance – Commercially available ADC

REFERENCE BOOKS

1. Digital Logic & Computer Design / M. Morris Mano / Prentice Hall of India, N. Delhi
2. Digital Principles & Applications / Malvino & Leach / Tata McGraw-Hill
3. Modern Digital Electronics / R.P. Jain / Tata McGraw-Hill
4. Digital Logic Applications & Design / M. Yarbrough / Vikash Publishing House
5. Digital Computer Electronics / Malvino & Brown / Tata McGraw-Hill
6. Digital Systems / Ronald J. Tocsin / Prentice Hall of India, N. Delhi
7. Digital Electronics & Microcomputers / R. K. Gaur / Dhanpat Rai Publications
8. Fundamental of Digital Circuits / A. Anand Kumar / Prentice Hall of India, N. Delhi

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COMPUTER SYSTEM ARCHITECTURE

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 3 / T6 / CSA	Part II – 1st Semester	17 weeks	per week	100

OBJECTIVE

This subject deals with the way the I/O devices, memory, CPU and instruction set are organised to give the existence to computer system. This paper will enable the student to comprehend the computer organisation and working principle of various units of computer system in a consolidated manner.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	EVOLUTION OF COMPUTER & BASIC STRUCTURE	10
	2	NUMBER SYSTEM & CODE	8
	3	INSTRUCTION & ADDRESSING MODES	10
B	4	CENTRAL PROCESSING UNIT	12
	5	MEMORY	10
	6	INPUT OUTPUT DEVICES	10

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	15	ANY 25	1	1 x 25 = 25	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	10	10 X 5 = 50
B	4, 5, 6	17				FOUR			

DETAIL COURSE CONTENT

GROUP – A 28 PERIODS

Module 1 EVOLUTION OF COMPUTER & BASIC STRUCTURE 10

1.1 Brief history of development of Babbage's Machine.

1.2 Stored program concept.

1.3 Von Neumann Architecture (Block Diagram) — Role of different units & components with examples.

1.4 Generations of computers — SSI, LSI & VLSI classification — Micro, Mini, Mainframe & Supercomputers — PC, PC/XT, PC/AT — Functional units, Bus structures.

Module 2 NUMBER SYSTEM & CODE 8

2.1 Bits, Bytes, Word

2.2 Fixed & Floating point numbers representation

2.3 Arithmetic operation — Booth's algorithm

2.4 NUMBER REPRESENTATION: Sign magnitude, 1's complement, 2's complement forms, Common errors, Round off errors

2.5 CODES: BCD, Excess-3, Gray, ASCII, EBCDIC

Module 3 INSTRUCTION & ADDRESSING MODES 10

3.1 Different types of Instructions.

3.2 Instruction Format.

3.3 Execution of Instruction.

3.4 ADDRESSING MODES**:** Implied, Immediate, Direct, Register, Register Indirect, Indirect, Indexed, Paged

GROUP – B 32 PERIODS

Module 4 CENTRAL PROCESSING UNIT 12

4.1 Explain different CPU registers – General purpose, Special purpose.

4.2 Arithmetic Logic Unit (Block Diagram only) and its functionality.

4.3 Hardwired Control.

4.4 Micro program Control.

Module 5 MEMORY 16

5.1 TYPES OF MEMORY: Input processor memory – Main Memory – Secondary Memory – Memory Organization

5.2 Memory hierarchy considering size, speed, cost.

5.3 VIRTUAL MEMORY: Overview of paging and page replacement techniques.

5.4 Floppy & Hard Disk (Sectors, Tracks, & Cylinders, Accessing mechanisms, Storage capacity), Magnetic tapes, CD-ROM.

5.5 MEMORY ORGANIZATION: SRAM, DRAM, ROM, PROM, EPROM, EEPROM etc.

5.6 Cache memory & cache memory organisation.

Module 6 INPUT OUTPUT DEVICES 10

6.1 Different peripheral devices and I/O interfaces.

6.2 I/O addressing with memory-mapped and I/O-mapped.

6.3 DMA – Interrupt – I/O Processor.

REFERENCE BOOKS

1. Computer System Architecture / M. Moris Mano
2. Computer Organization / Hamacher, Vranesic, Zaky / McGraw-Hill
3. Computer Organization and Architecture / William Stallings / Prentice Hall of India, N. Delhi
4. Computer Fundamentals – Architecture and Organization / B Ram / Tata McGraw-Hill
5. Microprocessor / Ajit Pal / Tata McGraw-Hill
6. Computer System Architecture / V. K. Jain / S.K. Kataria & Sons

PC UTILITY LAB

Subject Code	Course offered in	Course Duration	4 sessional contact periods	Full Marks
IT / 3 / S1 / PCUL	Part – II First Semester	17 weeks	per week	100

OBJECTIVE

The student will acquire the knowledge of using different software packages by this laboratory oriented subject.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	CONTACT PERIODS
1	CREATION OF SPREADSHEET	15
2	USE OF A DATABASE PACKAGE	30
3	PREPARATION OF A PRESENTATION	15

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – II First Semester. **Distribution of marks**: Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – II First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** ON SPOT JOB – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

Module 1 CREATION OF SPREADSHEET 15

To be able to create Mark sheets / Pay sheets / Monthly or Yearly expenditure sheets / any other worksheet using a spreadsheet package.

Module 2 USE OF A DATABASE PACKAGE 30

To study a system related to the Institution / Country / Industry, and then, to create and manipulate data and generate report using a database package.

Module 3 PREPARATION OF A PRESENTATION 15

To prepare a presentation about oneself / Institution / Country / any other topic.

PROGRAMMING IN C LAB

Subject Code	Course offered in	Course Duration	3 sessional contact periods	Full Marks
IT / 3 / S2 / LC	Part – II First Semester	17 weeks	per week	100

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to develop the skills complementary to the knowledge acquired in the theoretical subject PROGRAMMING IN C.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	CONTACT PERIODS
1	BASIC OF PROGRAMMING	3
2	OPERATORS AND EXPRESSIONS	6
3	DECISION MAKING	7
4	ARRAYS	7
5	USER DEFINED FUNCTIONS	7
6	POINTERS	6
7	STRUCTURE	4
8	FILE HANDLING	5

CONTACT PERIODS: 45 INTERNAL ASSESSMENT: 6 TOTAL PERIODS: 51

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – II First Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – II First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

Module 1 BASIC OF C PROGRAMMING 3

1.1 To execute a sample C program to study the basic structure of C program.

1.2 To be familiar with keywords and identifiers through some program.

1.3 To apply constant, variables and different types of data types.

Module 2 OPERATORS & EXPRESSIONS 6

2.1 To write program using Arithmetic, Relational, Logical and Assignment operators.

2.2 To write program to implement increment & decrement operators and to find the greatest between two numbers using conditional operator.

2.3 To evaluate an expression to study operator precedence and associativity and to write a program using casting a value.

Module 3 DECISION MAKING 7

3.1 To use formatted scanf( ) and printf( ) functions for different types of data.

3.2 To find the roots of a quadratic equation. Find the greatest of three numbers using IF –ELSE and IF - ELSE IF statements.

3.3 To test whether the given character is vowel or not, using nested if –else statement and Switch-case statement.

3.4 To find sum of first n natural number using 'GOTO' statement

3.5 To find the sum of all Fibonacci numbers in between 1 to n using 'for' loop.

3.6 To find G.C.D and L.C.M of two numbers using 'WHILE' loop.

3.7 To find the sum of the digits of an integer using DO –WHILE loop structure.

3.8 To solve other problems for the implementation of different loop structure.

Module 4 ARRAYS 7

4.1 To write a program to accept 10 numbers, store them in a single dimensional array and to make the average of the numbers.

4.2 To make an array of n elements and sort them and to write a program to check whether an input number is palindrome or not.

4.3 To write a program to accept a string and to count the no of vowels present in this string.

4.4 To write programs on matrix operation (addition, subtraction & multiplication).

4.5 To write some programs to utilize different string handling functions and to create an array to store the names of 10 students arranging them alphabetically.

Module 5 USER DEFINED FUNCTIONS 7

5.1 To write a program to find the sum of the digits of a given number using function.

5.2 To write program using functions**: —**
(a) with no argument and no return value;
(b) with argument and no return value;
(c) with argument and return value.

5.3 To find out the factorial of a given number using recursive function.

5.4 To write a program that uses a function to sort an array of integers.

5.5 To write programs to illustrate auto variable, external variable, static variable and register variable.

Module 6 POINTERS 6

6.1 To write a program to access variables using pointer.

6.2 To write a program to assign the address of an integer array to a pointer variable 'p' and add all the array elements through 'p'.

6.3 To write programs to explain parameter passing 'by reference 'and 'by value'.

Module 7 STRUCTURE **4**

7.1 To write a program to define and assign values to structure members

7.2 To write program to explain structure with arrays.

7.3 To define and assign values to 'Union' members.

Module 8 FILE HANDLING **5**

8.1 To write to and read from a sequential access file (use character type data).

8.2 To create an integer data file, to read this file and to write all odd numbers to a new file.

8.3 To write program to use different functions used in file handling.

8.4 To make a random access to a file.

BASIC ELECTRONICS LAB

Subject Code	Course offered in	Course Duration	Full Marks
IT / 3 / S3 / LBET	Part – II First Semester	17 weeks	100

CONTACT PERIODS	INTERNAL ASSESSMENT	TOTAL
45 @ 3 sessional contact periods per week for 15 weeks	6 periods	51 periods

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to develop the skills corresponding to the knowledge acquired in the theoretical subject BASIC ELECTRONICS.

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers Part – II First Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – II First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

Job 1 To be familiar with the common assembly tools.

Job 2 To be able to identify the following passive and active circuit elements**:** —
Resistor, capacitor, inductor, transformer, relay, switches, batteries/cells, diode, transistors, SCR, DIAC, TRIAC, LED, LCD, photodiode, phototransistors, ICs etc.

Job 3 To be familiar with the following basic instruments**:** —
Multimeter, oscilloscope, power supply and function generator.

Job 4 To practice soldering and desoldering.

Job 5 To construct & test a battery eliminator and simple amplifier circuit on a Bread Board and Vero Board.

DIGITAL LOGIC DESIGN LAB

Subject Code	Course offered in	Course Duration	Full Marks
IT / 3 / S4 / LDLD	Part – II First Semester	17 weeks	100

CONTACT PERIODS	INTERNAL ASSESSMENT	TOTAL
60 @ 4 sessional contact periods per week for 15 weeks	6 periods	68 periods

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to develop the skills corresponding to the knowledge acquired in the theoretical subject DIGITAL LOGIC DESIGN.

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – II First Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – II First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

(At least any ten experiments from the following)

1. To verify the truth tables for AND, OR, NOT, XOR, XNOR, NAND AND NOR gates.
2. To design Half adder and Full adder using all NAND gates or with all NOR gates.
3. To realize a truth table or a logic expression using the minimum number of logic gates.
4. To study 4-bit full adder IC chip (7483); Cascading of 7483.
5. To design 1's, 2's, 9's and 10's complement circuit using full adder.
6. To design BCD adder.
7. To design a simple multiplexer using discrete logic gates.
8. To use commercial multiplexer using IC chips for the design of combinational circuits.
9. To design simple decoder using discrete logic gates.
10. To use commercial multiplexer IC chips for the design of multi-output combinational circuit.
11. To design Gray-to-Binary and Binary-to-Gray code converter using discrete logic gates, multiplexers & decoders.
12. To design RS and D latch using all NAND gates or NOR gates.
13. To debounce mechanical switch using latch.
14. To design Master Slave JK flip-flop.
15. To design ripple counter.
16. To design synchronous counter.
17. To study some commercially available counter chips.
18. To design shift registers using flips-flops and to study its behaviour.
19. To study commercially available shift register IC chips.
20. To design astable and monostable multivibrator using 555 timer chip.
21. To study commercially available ADC and DAC chips.
22. To design ramp generator using DAC and counter.

BUSINESS APPLICATION LAB

(COBOL)

Subject Code	Course offered in	Course Duration	4 sessional contact periods	Full Marks
IT / 3 / S5 / BALC	Part – II First Semester	17 weeks	per week	100

OBJECTIVE

The student will learn this language in laboratory oriented subject to develop programs for business oriented problems.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPICS	CONTACT PERIODS
1	INTRODUCTION TO COBOL PROGRAMMING	8
2	PROGRAMMING STATEMENTS	14
3	TABLE MANIPULATION & COBOL SUBROUTINE	15
4	SEQUENTIAL FILE HANDLING	20
5	FEATURES OF COBOL-85	3

CONTACT PERIODS: 60 **INTERNAL ASSESSMENT: 8** **TOTAL PERIODS: 68**

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – II First Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – II First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

Module 1 INTRODUCTION TO COBOL PROGRAMMING 8

1.1 INTRODUCTION: Advantages of COBOL — History of COBOL — Structure of a COBOL program — COBOL Characters and Words — Data Names and Identifiers — Literals — Figurative Constants.

1.2 THE FOUR DIVISIONS

(i) Identification Division: syntax and entries;

(ii) Environment Division: SECTIONS — Configuration section, Input-Output section;

(iii) Data Division: SECTIONS: File section, Working-storage section — Data structure and relationships — Record layout — The level numbers: 77, 01, 02, … ..., 49, 66, 88 — PICTURE clause for data description — VALUE & FILLER clause; for data editing — "Z", "*", "$", "-", "+", "CR", "DB", "." (period / decimal point), "," (comma), "b" (blank insertion), "0" (zero insertion), "/", BLANK WHEN ZERO — REDEFINES clause — RENAMES clause;

(iv) Procedure Division: STRUCTURE of the procedure division — Data movement verb: MOVE — Arithmetic verbs: ADD, SUBTRACT, MULTIPLY, DIVIDE — Sequential Control verbs: GO TO, STOP — Input-Output verbs: ACCEPT, DISPLAY, OPEN, CLOSE, READ, WRITE — Conditional verb: IF.

Module 2 PROGRAMMING STATEMENTS 14

2.1 INPUT / OUTPUT STATEMENTS: ACCEPT, DISPLAY verbs

2.2 COMPUTATIONAL STATEMENTS: Arithmetic verbs – ADD, SUBTRACT, MULTIPLY, DIVIDE, COMPUTE statements

2.3 DATA MOVEMENT STATEMENTS: MOVE with CORRESPONDING clause — ADD, SUBTRACT with CORRESPONDING clause — COMPUTE with ROUNDED — ON SIZE option

2.4 TYPES OF CONDITIONS: Relational Conditional — Sign Condition — Class Condition — Condition-Name Condition — Negated Simple Condition — Compound Condition

2.5 DATA DESCRIPTION CLAUSE: USAGE, SYNCHRONIZED, JUSTIFIED, REDEFINES, RENAMES, SIGN clauses

2.6 SEQUENCE CONTROL: IF statement — Nested IF statement — GO TO with DEPENDING phrase — ALTER statement — PERFORM statement — EXIT statement

Module 3 TABLE MANIPULATION & COBOL SUBROUTINE 15

3.1 ONE DIMENSIONAL AND MULTI DIMENSIONAL TABLES: Declaring an array — Initialising tables — OCCURS clause with DEPENDING ON phrase

3.2 PERFORM VERB AND TABLE HANDLING: PERFORM with TIMES option — UNTIL option — VARYING option — VARYING–AFTER option

3.3 SORTING & INDEXING: SET verb — SEARCH verb — SORT verb — Sorted tables & binary search — Searching a multi-dimensional table — MERGE statement

3.4 COBOL SUBROUTINE: Structure of a COBOL Subroutine — LINKAGE SECTION — Calling of a Subroutine (CALL statement) — State of a Subroutine & CANCEL statement

Module 4 SEQUENTIAL FILE HANDLING 20

4.1 SEQUENTIAL FILES: Record size, block size, buffers, label records, disk directory; File characteristics; sequential file organization; line sequential file organization; indexed sequential file organization

4.2 FILE-CONTROL ENTRIES: RESERVE clause; ORGANIZATION / ACCESS clause; FILE STATUS clause; (syntax and use)

4.3 FILE DESCRIPTION: FD entry for fixed length records; BLOCK CONTAINS clause; RECORD CONTAINS clause; LABEL RECORD clause; VALUE OF clause

4.4 STATEMENTS FOR SEQUENTIAL FILES: OPEN, CLOSE, WRITE, REWRITE statements – syntax and use in programs

4.5 REPORT GENERATION: FILE SECTION – REPORT clause; REPORT – DESCRIPTION entry; WRITE statement for printer records; Use of WRITE statement with FROM BEFORE / AFTER ADVANCING options; AT End-of-page option

4.6 SORTING / MERGING: SORT verb; SORT verb with ascending / descending; File Updation; File Matching; File Merging; MERGE verb; RELEASE statement; RETURN statement

Module 5 FEATURES OF COBOL - 85 3

REFERENCE BOOKS

1. COBOL Programming including MS-COBOL & COBOL – 85 / M. K. Roy & D. Ghosh Dastidar / Tata McGraw-Hill
2. COBOL Programming: Problems and Solution / M. K. Roy & D. Ghosh Dastidar / Tata McGraw-Hill
3. A Practical approach to COBOL Programming / Shard Kant / Wiley Eastern Ltd.
4. Computer Programming in COBOL / Rajaraman & Sahasrabuddhe / Prentice Hall of India, N. Delhi.

COMMUNICATION SKILLS (JOB)

Subject Code	Course offered in	Course Duration	2 lecture contact periods	Full Marks
IT / 4 / T1 / CSJ	Part – II Second Semester	17 weeks	per week	38

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to: —

(i) write letters asking for application forms;
(ii) fill in application forms;
(iii) prepare a resume or a CV;
(iv) write letters of application in response to advertisements;
(v) learn how to write memos;
(vi) learn how to write letters of enquiry, letters of complaint and letters to place orders;
(vii) learn to understand and respond to tender notices.

MODULAR DIVISION OF THE SYLLABUS & EXAMINATION SCHEME

MODULE	TOPIC	CONTACT PERIODS	SUBJECTIVE QUESTIONS TO BE SET	TOTAL MARKS TO BE ANSWERED
1	Looking for a Job	12	Questions to be set, following the skills developed following the units in the text book: "ENGLISH SKILLS FOR TECHNICAL STUDENTS – TEACHERS' HANDBOOK"	16
2	At the Workplace	18		22

CONTACT PERIODS: 30 **INTERNAL ASSESSMENT: 4** **TOTAL PERIODS: 34**

DETAIL COURSE CONTENT

Module 1 LOOKING FOR A JOB 12 PERIODS

Asking for an Application Form — Filling in Application Forms — Writing a Covering Letter — Writing a Curriculum Vitae — Letters of Application: Reporting to an Advertisement

Module 2 AT THE WORKPLACE 18 PERIODS

Writing Memos — Business Letters: General Features — Letters of Enquiry — Letters to Place Orders

TEACHING INSTRUCTIONS

There should be no difference between the teaching methodology of the lecture classes of the subject COMMUNICATION SKILLS (JOB) and those of the sessional classes of the subject COMMUNICATION SKILLS (JOB) LAB, since all the modules are practical oriented.

Things to be followed by the polytechnics for effective teaching of the subject: —

(i) L R U C Room to be used for the classes;
(ii) English newspapers be made available on a regular basis to the students;
(iii) samples of different Application Forms be available the students.

TEXT BOOK

ENGLISH SKILLS for Technical Students – TEACHERS' HANDBOOK / West Bengal State Council of Technical Education in collaboration with THE BRITISH COUNCIL / Orient Longman

DATA STRUCTURE

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 4 / T2 / DSC	Part – II Second Semester	17 weeks	per week	75

OBJECTIVE

The study of data structure is an essential part of computer science. This subject develops the concept of storage structure of data and helps to write efficient application program.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	PROBLEM SOLVING AND SOME CONCEPTS	06
	2	PRIMITIVE & NON PRIMITIVE LINEAR DATA STRUCTURE	25
	3	RECURSION	03
B	4	NON-PRIMITIVE NON-LINEAR DATA STRUCTURES	10
	5	SORTING AND SEARCHING	16

CONTACT PERIODS: 60 **INTERNAL ASSESSMENT: 8** **TOTAL PERIODS: 68**

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	19	ANY 25	ONE	1 x 25 = 25	FIVE	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	4, 5	14				FOUR			

DETAIL COURSE CONTENT

GROUP – A 34 PERIODS

Module 1 PROBLEM SOLVING & SOME CONCEPTS 6

Algorithms and flow charts, concepts of algorithmic complexity (big O notation, small o notation), concepts of structured programming: top-down design. Control structures, concepts of program modules functions and subroutines. (Algorithms are to be described in C like pseudo language)

Module 2 PRIMITIVE & NON-PRIMITIVE LINEAR DATA STRUCTURE 25

2.1 PRIMITIVE DATA STRUCTURES: Integer (signed, unsigned, long, short) — Real (float, double, long double) — Character and Boolean data types — their declaration & space usage in computer memory.

2.2 NON-PRIMITIVE DATA STRUCTURES:

2.2.1 ARRAY: Definition — Declaration initialisation and usage of one and two-dimensional arrays —Numeric and character type arrays — Arrays as parameters — Matrix operations: Addition, subtraction, multiplication, transpose

2.2.2 STRING: Definition — Declaration — String operations: String comparison, length of a string, concatenation of two strings, copy of a string, extract a portion of a string, reversing of a string

2.2.3 STACK: Definition — Declaration — Operation — Stack implementation using array — Expression evaluation by stack (infix, prefix and postfix)

2.2.4 QUEUE: Definition — Declaration — Operation — Priority queue (definition and example)

2.2.5 LINKED LISTS: Concepts and representation of linked lists in memory — Array implementation of lists and its limitation — Operation and analysis of singly, doubly and circular linked lists, their comparison and applications (e.g., polynomial arithmetic)

Module 3 RECURSION 3

Basic concepts and examples of recursion e.g. factorial problem, Fibonacci sequence etc. — Direct and indirect recursion and their overhead.

GROUP - B 26 PERIODS

Module 4 Non-Primitive Non-Linear Data Structures 10

4.1 Concepts of non-linear data structures and their examples — Compare it with linear data structure

4.2 TREE: Definition and application of tree — Binary tree: Definition and it's Implementation, expression processing by binary tree — Tree traversal (pre-order, post-order and in-order) — Spanning tree concept and its application — Balancing of a tree — AVL tree its definition, construction and rotation — B-tree its definition and use

Module 5 Sorting & Searching 16

5.1 Definition of internal and external Sorting and Searching and their examples

5.2 SORTING: Algorithms and their analysis (time and space) — Bubble sort — Insertion sort — Merge sort — Quick sort — Radix sort — Heap sort

5.3 SEARCHING: Linear search — Binary search — Hashing — Hash functions, their collisions & resolutions

REFERENCE BOOKS

1. Data Structures using C & C++ / Y. Langsam, M. J. Augenstein and A. M. Tenenbaum / PHI
2. Mastering Algorithms with C / Kyle Loudon, O'Reilly / SPD
3. Introduction to Data Structures with application / Tremblay / Tata McGraw-Hill

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MICROPROCESSOR & ITS INTERFACING

Subject Code	Course offered in	Course Duration	4 lecture contact periods per week	Full Marks
IT / 4 / T3 / MPI	Part – II Second Semester	17 weeks		75

OBJECTIVE

On successful completion of this course, the students can enhance their knowledge regarding Microprocessors, Assembly language programming and Interfacing.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	INTRODUCTION TO MICROPROCESSORS	02
	2	ARCHITECTURE OF MICROPROCESSORS	16
B	3	PROGRAMMING OF MICROPROCESSORS	18
C	4	INTERFACING OF MEMORY AND I / O PORTS	18
	5	CASE STUDIES ON THE APPLICATION OF MICROPROCESSORS	6

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	19	ANY 25	ONE	1 x 25 = 25	FIVE	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	4, 5	14				FOUR			

DETAIL COURSE CONTENT

GROUP – A 18 PERIODS

Module 1 INTRODUCTION TO MICROPROCESSORS 2

Evolution of microprocessors; Specific features of microprocessors; Application of microprocessors.

Module 2 ARCHITECTURE OF MICROPROCESSORS 16

Explanation of each Functional Block Diagram and Internal Architecture of 8086/8088 – ALU, Registers, Control unit, Clocks, Bus Structure; Address, Data and Control Bus of 8085, 8086/8088; pin Details of 8085, 8086/8088, Introduction to PC range of Microprocessors.

GROUP – B 18 PERIODS

Module 3 PROGRAMMING OF MICROPROCESSORS

Different Addressing modes of 8085,8086/8088; Instruction Cycle of 8085,8086/8088 (including subroutine calls, jumping, comparing, string instructions of 8086); Timing Diagram of different parts of Instruction Cycles; Solving basic problems of Assembly Language Programming using 8085 Trainer Kit and Using any 8086 Assembler or DOS Debug Program.

GROUP – C 24 PERIODS

Module 4 INTERFACING OF MEMORY AND I/O PORTS 18

Address Space; Memory mapped I/O, I/O mapped I/O; address Decoding and Interfacing of Memory; DMA Description with sequence of steps and control flow, Structure of a generic DMA controller; programmer's model of 8251, Programmer's model of 8255 with its Interfacing; Outputting data to Parallel Port using 8086 Commands in DOS/WIN9x; Interrupts – Hardware and Software interrupts, A brief overview of BIOS Interrupts, An introduction to (i) Disk Access Interrupts (ii) CRT/Graphics Interrupts.

Module 5 CASE STUDIES ON THE APPLICATION OF MICROPROCESSORS 6

Data Acquisition system using ADC 0808/0809 and Sensor (temperature) Interfacing using AD 590.

REFERENCE BOOKS

1. Microprocessor Architecture, Programming and Applications – Ramesh S Goonkar.
2. Microprocessors and Interfacing – Douglas V Hall
3. Fundamentals of Microprocessors and Microcomputers – B Ram.
4. Advances Microprocessors and interfacing – B Ram.

OBJECT ORIENTED PROGRAMMING METHODOLOGY

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 4 / T4 / OOP	Part – II Second Semester	17 weeks	per week	75

OBJECTIVE

Now-a-days object oriented methodology is adopted almost for every computer based programmes due to the reusability of the objects. This subject exposes the learner to the various typical object oriented concepts like classes, objects, inheritance, operator overloading, constructors, destructors, templates etc. It also makes the reader to realize the advantages of object oriented programming methodology over conventional procedural programming methodology.

Note: *Language features of this course should be taken from C++ language.*

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	PRINCIPLE OF OOPS	05
	2	DATA TYPES AND I/O OPERATION	05
	3	CLASSES & OBJECTS	09
	4	CONSTRUCTORS AND DESTRUCTORS	06
B	5	OPERATOR OVERLOADING	10
	6	INHERITANCE	10
	7	POLYMORPHISM	05
C	8	FILE HANDLING	06
	9	TEMPLATE & EXCEPTION HANDLING	04

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3, 4	14	ANY 25	ONE	1 x 25 = 25	FOUR	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	TEN	10 X 5 = 50
B	5, 6, 7	14				FOUR			
C	8, 9	6				TWO			

DETAIL COURSE CONTENT

GROUP – A 25 PERIODS

Module 1 PRINCIPLE OF OOPS 05

Procedure Oriented paradigm – Object Oriented paradigm – Object Oriented Design & Analysis.

Module 2 DATA TYPES AND I/O OPERATION 05

Basic data types – User defined data types – Operators & Expressions – Formatted & unformatted I/O.

Module 3 CLASSES & OBJECTS 09

Class, Class Members and Objects – Member functions – Member Access Specifiers (public, private, protected) – Static class member – Arrays within a Class and Array of Objects - Passing Objects as function arguments and returning object from a function.

Module 4 CONSTRUCTORS & DESTRUCTORS 06

Purpose of Constructor and Destructor – Constructor for without-parameter, with-parameter, default-argument – Multiple constructor in a class – Copy Constructor – Destructors.

GROUP – B 25 PERIODS

Module 5 OPERATOR OVERLOADING 10

Definition – Unary Operator Overloading – Binary Operator Overloading – String Manipulation using Operator – TYPE CONVERSIONS: (i) Conversion from Basic type to Class Type, (ii) Conversion from Class Type to Basic Type, (iii) Conversion from one class to another class type.

Module 6 INHERITANCE 10

Base and Derived Classes – Single Inheritance – Public, Private and Protected Inheritance – Multilevel and Multiple Inheritance – Hierarchical Inheritance – Virtual Base Classes.

Module 7 POLYMORPHISM 05

Fundamental idea on Polymorphism – Pointer to object and derived class – 'This' pointer – Virtual function and pure Virtual Function – Concept of Friend Function.

GROUP – C 10 PERIODS

Module 8 FILE HANDLING 06

Streams and stream classes – Classes for file stream operation – Opening and closing files – Handling of error – Command line arguments.

Module 9 TEMPLATE & EXCEPTION HANDLING 04

Class template & function template – Template arguments – Exception Handling.

REFERENCE BOOKS

1. Objected Oriented Programming with C++, By – E Balaguruswami (TMH)
2. Object Oriented Programming in Microsoft C++, By- Robart Lafore.
3. Let Us C++, By- Y Kanethkar.

ELECTRONICS DEVICE & CIRCUIT

Subject Code	Course offered in	Course Duration	3 lecture contact periods	Full Marks
IT / 4 / T5 / EDC	Part – II Second Semester	17 weeks	per week	75

OBJECTIVE

This subject will enable the students to comprehend the concepts and working principle of electronics devices and circuits and their application in electronic system. The knowledge acquired by student will help them to troubleshoot and repair electronic circuits and devices.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	PERIODS
A	1	TRANSISTOR BIASING	8
	2	SMALL SIGNAL TRANSISTOR AMPLIFIER	8
	3	RECTIFIER & POWER SUPPLY	15
B	4	OPERATIONAL AMPLIFIER	10
	5	TIMER CIRCUITS	04

CONTACT PERIODS: 45 INTERNAL ASSESSMENT: 6 TOTAL PERIODS: 51

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	22	ANY 25	ONE	1 x 25 = 25	SIX	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	4, 5	11				THREE			

DETAIL COURSE CONTENT

GROUP – A 31 PERIODS

Module 1 TRANSISTOR BIASING 8

1.1 Concept of Q-point – AC and DC load line – Stabilization and stability factor

1.2 TYPES OF BIASING: (a) Base Bias, (b) Collector Feedback Bias, (c) Emitter Feedback Bias, (d) Potential Divider Bias.

1.3 Bias compensation circuits using diode and thermistors – FET biasing

Module 2 SMALL SIGNAL TRANSISTOR AMPLIFIER 8

2.1 Hybrid model and h-parameters of CB, CE & CC mode transistor amplifier – Calculation of voltage gain, current gain, power gain, input and output impedance in terms of h-parameters for RC coupled amplifier – Comparison of three configurations

2.2 Functional Characteristics and the operation of MOSFET and CMOS

Module 3 RECTIFIER & Power Supply 15

3.1 Half-wave and full-wave rectifier, average voltage, rms voltage, efficiency and ripple factor, percentage voltage regulation

3.2 Function of filter circuits: Capacitor input filter, inductive filter, Π type filter – Calculation of ripple factor and average output voltage – Function of bleeder resistor

3.3 Series and shunt regulator using transistor

3.4 Concept of switch mode power supply

3.5 Block schematic description of uninterrupted power supply.

GROUP – B 14 PERIODS

Module 4 OPERATIONAL AMPLIFIER 10

4.1 Circuit operation of differential amplifier, single ended and double ended

4.2 Introduction to operational amplifier – Inverting and non inverting mode and their gain calculation – Common mode rejection ratio – Bias current – Offset voltage and current – Slew rate, open loop and closed loop gain – Input and output impedance – Frequency response and virtual ground

4.3 Applications of OPAMP as: Adder, Subtractor, Voltage Follower, Integrator, Differentiator, Comparator, Schmitt Trigger

Module 5 TIMER CIRCUITS **4**

5.1 Principle of operation of electronic timer

5.2 Functional description of internal blocks of timer IC555

5.3 Use of 555 timers in monostable and astable mode

5.4 Principle of operation of digital timer

REFERENCE BOOKS

1. Electronic Principles / Malvino / Tata McGraw-Hill
2. Electronic Devices and Circuits / Boylestad & Nashalsky / Prentice Hall of India, N. Delhi
3. Electronic Devices and Circuits / S. Salivanan / Tata McGraw-Hill
4. Electronic Devices and Circuits / Mottershed / Prentice Hall of India, N. Delhi
5. Electronic Devices and Circuits / Millman & Halkias / Tata McGraw-Hill
6. Electronic Fundamentals and Applications / Chattopadhyay & Rakhshit / New Age International
7. Basic Electronic & Linear Circuits / Bhargava / Tata McGraw-Hill
8. Electronic Principle / Sahadeb / Dhanpat Rai & Sons

COMMUNICATION SKILLS (JOB) LAB

Subject Code	Course offered in	Course Duration	2 sessional contact periods	Full Marks
IT / 4 / S1 / LCSJ	Part – II Second Semester	17 weeks	per week	50

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to: —

(i) look for suitable jobs by skimming through job advertisement;
(ii) scan advertisements for specific information about particular jobs;
(iii) develop aural-oral skills, recognition and interpretation of linguistic and non-linguistic forms which relate to job interviews;
(iv) prepare for an interview;
(v) respond appropriately and politely at an interview;
(vi) take part in group discussions;
(vii) learn all kinds of communication needed at the workplace, including telephone calls.

MODULAR DIVISION OF THE SYLLABUS & EXAMINATION SCHEME

MODULE	TOPIC	CONTACT PERIODS	MARKS ALLOTTMENT
1	Looking for a Job	6	**Continuous Internal Assessment of 25 marks** is to be carried out throughout the second year second semester, which should be based on the students' performance of the tasks given by the subject teacher. The tasks would include: (a) different kinds of business letters – at least two; (b) memo – at least two; (c) job application – at least two; (d) report writing – teachers' discretion. **External Assessment of 25 marks** shall be held at the end of Part – II Second Semester.
2	Job Interviews	16	
3	At the Workplace	8	

CONTACT PERIODS: 30 **INTERNAL ASSESSMENT: 4** **TOTAL PERIODS: 34**

DETAIL COURSE CONTENT

Module 1 LOOKING FOR A JOB **6**

Identifying Sources — Skimming Newspapers for Information

Module 2 JOB INTERVIEWS * **16**

Preparing for an interview — Responding Appropriately — Group Discussions — Using Language Effectively for Interaction

* Mock interviews are to be arranged and to be conducted by any suitable person

Module 3 AT THE WORKPLACE 8

Communicating using the telephone.

TEACHING INSTRUCTIONS

There should be no difference between the teaching methodology of the lecture classes of the subject COMMUNICATION SKILLS (JOB) and those of the sessional classes of the subject COMMUNICATION SKILLS (JOB) LAB, since all the modules are practical oriented.

Things to be followed by the polytechnics for effective teaching of the subject: —

(a) L R U C Room to be used for the classes;
(b) English newspapers be made available on a regular basis to the students;
(c) samples of different Application Forms be made available to the students.

TEXT BOOK

ENGLISH SKILLS for Technical Students – TEACHERS' HANDBOOK / West Bengal State Council of Technical Education in collaboration with THE BRITISH COUNCIL / Orient Longman

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DATA STRUCTURE LAB

Subject Code	Course offered in	Course Duration	5 sessional contact periods	Full Marks
IT / 4 / S2 / LDS	Part – II Second Semester	17 weeks	per week	100

OBJECTIVE

Data Structures are commonly used in many program designs. Here following programs are based on the C language and the following exercises include developing algorithms, writing code, entering the program, compiling and debugging the program, giving test data and executing the program.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	PERIODS
1	ARRAY, STRING, STACK, QUEUE & POINTER RELATED PROBLEMS	22
2	STRUCTURE , UNION , LINKED LIST RELATED PROBLEMS	18
3	RECURSION , SORTING , SEARCHING ,TREE & FILE	35

CONTACT PERIODS: 75 INTERNAL ASSESSMENT: 10 TOTAL PERIODS: 85

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – II Second Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – II Second Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

Module 1 ARRAY, STRING, STACK, QUEUE & POINTER RELATED PROBLEMS 22

1.1 One and two dimension ARRAY related problems.
1.2 Different STRING operations using different C library functions
1.3 Creation of STACK and its related problems such as expression conversion and evaluation.
1.4 QUEUE, its creation and related problems.
1.5 POINTER related problems.

Module 2 STRUCTURE , UNION , LINKED LIST RELATED PROBLEMS 18

2.1 To create a heterogeneous data structure (using STRUCTURE) and then perform related problems.

2.2 Singly, Doubly and Circular LIST related problems.

Module 3 RECURSION, SORTING, SEARCHING, TREE & FILE 35

3.1 To write a RECURSIVE function and change it to non-recursive way.

3.2 To write the following different SORTING programs in C**:** —
(a) Bubble sort, (b) Insertion sort, (c) Merge sort, (d) Quick sort, (e) Radix sort, and, (f) Heap sort.

3.3 To construct a binary TREE and traverse its different nodes.

3.4 Binary SEARCH related problems.

3.5 FILE related problems.

REFERENCE BOOKS

1. Classic Data Structures / D. Samanta / PHI
2. Data Structures using C and C++ / Tanenbaum / PHI
3. Programming with C / R. K. Venugopal & Prasad / Tata McGraw-Hill

LIST OF SAMPLE PROBLEMS FOR DATA STRUCTURE LAB

1. To write a program to check whether a word is palindrome or not.
2. To create a two dimensional array of numbers and calculate & display the row & column sum and the grand total.
3. To write a program of matrix multiplication.
4. To write a program to insert (Push) an element into the sack and delete (Pop) an element from the stack using pointer.
5. To write a program to convert an infix expression to a postfix expression.
6. To evaluate a postfix expression.
7. To write a program to insert an element in the queue and delete an element from the queue using pointer.
8. To create a circular queue and add an element and delete an element from a circular queue.
9. To write a program of a structure containing an item name along with the unit price. The user enters the item name and quantity to be purchased. Program print outs total price of item with name using pointer in a structure or array in a structure.
10. To create a single linked list and — (a) insert a node in the list (before header node, in between two nodes, end of the list); (b) delete a node from the list (1^{st} node, last node, in between two nodes); (c) Concatenate two lists.
11. To create a doubly linked list and — (a) insert a node in the list (before header node, in between two nodes, end of the list); (b) delete a node from the list (1^{st} node, last node, in between two nodes); (c) Concatenate two lists.
12. To create a circular linked list and insert & delete an element from the list.
13. To write a program to calculate the binomial co-efficient of ${}_nC^r$ of two numbers using recursive function. Also write the same program using function in non-recursive way.
14. To write a program to generate Fibonacci Series using recursive function. Also write the same program using function in non-recursive way.
15. To write a program to sort a list of numbers using — (i) Heap Sort, (b) Quick Sort, (c) Bubble Sort.
16. To write a program to sort a list of numbers using — (i) Insertion Sort, (b) Merge Sort, (c) Radix Sort.
17. To write a program to create a binary tree and traverse it in pre-order and post-order form.
18. To write a program to create a binary search tree and — (a) insert a new node in the BST, (b) search a node in the BST, (c) delete a node from the BST.
19. To write a program to create a file, read the file, update the file, insert into the file, and, delete from the file. (The file contains, say for example, student first name, middle name, surname, address, phone no., roll no., branch etc.)

MICROPROCESSOR LAB

Subject Code	Course offered in	Course Duration	Full Marks
CST / 4 / S3 / LMPI	Part – II Second Semester	17 weeks	100

CONTACT PERIODS	INTERNAL ASSESSMENT	TOTAL
75 @ 5 sessional contact periods per week for 15 weeks	10 periods	85 periods

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to develop the skills corresponding to the knowledge acquired in the theoretical subject MICROPROCESSOR & ITS INTERFACING.

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – II Second Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – II Second Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

Job 1	To be acquainted with the Microprocessor Trainer Kit; Hardware and User's commands.	5
Job 2	Assembly language program development ; Data transfer program – Register to Register, Register to Memory and vice-versa: Arithmetic operation-8 bit addition and subtration, multi-byte addition and subtraction, BCD addition and subtraction, multiplication using repeated additions, multiplication using shift-add process, signed multiplication, Binary division, BCD division.	25
Job 3	Sorting and searching; block movement; ordering of a collection of data.	5
Job 4	Look-up table – finding squares, cubes etc. of a number using look-up table; code conversion using look-up table.	10
Job 5	To develop the above program using a subroutine in a main program, delay routine.	5
Job 6	Input / Output programming 8255 with the basic I/O modes programming; to store the sample data of any analog signal using ADC and 7-segmen display using 8255 as a port; to design a thermometer using AD590, 0808, seven segment display, 8279 (micro-processor kit).	15
Job 7	Programming in 8086 using Debug programme: (i) Block move, Searching, Sorting; (ii) Port I/O (LPT1); (iii) Disk file accessing: (iv) Graphics text mode and Graphics mode.	10

OBJECT ORIENTED PROGRAMMING LAB

Subject Code	Course offered in	Course Duration	5 sessional contact periods per week	Full Marks
CST / 3 / S4 / LOOP	Part – II Second Semester	17 weeks		100

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to develop skills in objects oriented paradigm and programming using C++. They will also acquire knowledge in object based tool (Visual Basic).

MODULAR DIVISION OF THE SYLLABUS

GROUP	TOPIC	PERIODS
A	PROGRAMMING WITH C++	40
B	PROGRAMING WITH VISUAL BASIC	35

CONTACT PERIODS: 75 INTERNAL ASSESSMENT: 10 TOTAL PERIODS: 85

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – II Second Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.

2. **External Assessment of 50 marks** shall be held at the end of Part – II Second Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

GROUP - A PROGRAMMING WITH C++ 40

Job 1 Classes – objects – Declaring & Creating Objects – Concept of members variable, methods – Private, Public, protected variable.

Job 2 Constructors: Constructor with parameter – Constructor without parameter – Copy Constructor.

Job 3 Destructor.

Job 4 Passing objects to method.

Job 5 Inheritance: Private, Public, protected inheritance – Single, Multiple inheritance – Multilevel, hierarchical inheritance.

Job 6 Operator overloading & polymorphism: Unary operator overloading like ++, - - etc. – Binary operator overloading like arithmetic operator – Comparison operator, Assignment operator etc. – Introductory problem on virtual function & friend function.

Job 7 Class Templates and Exception handling.

GROUP - B VISUAL BASIC PROGRAMMING 35

Job 8 Start & Exit Visual Basic-Understanding Properties, Methods, Events-Visual Basic arithmetic operator.

Job 9 Understanding Variable names – Variable types- Range of Variable values, Working with String function, Numerical function – Visual Basic Programming Fundamental.

Job 10 Creating, Opening, Saving and Running VB Projects.

Job 11 Working with Form & Form Events: Form properties – Working with following Form Tool (Tool box, Tool Bar, Menu Bar, Colour Palate)

Job 12 Custom Control-Picture Box-Label Control –Text Box-Command Button-Shape-Frame-Check Box-Radio button-Combo Box-List Box etc.

Job 13 Understanding Focus-Setting Tab Order.

Job 14 Prompting user with Dialog Boxes.

Job 15 Programming with various objects.

Job 16 Working with Control array.

Job 17 Working with MDI Form.

REFERENCE BOOKS

1. Objected Oriented Programming with C++, By – E Balaguruswami (TMH)
2. Object Oriented Programming in Microsoft C++, By- Robart Lafore.
3. Let Us C++, By- Y Kanethkar.
4. Beginning Visual Basic 6 by : Peter Wright (SPD)

ELECTRONICS DEVICE & CIRCUIT LAB

Subject Code	Course offered in	Course Duration	Full Marks
CST / 4 / S5 / LEDC	Part – II Second Semester	17 weeks	100

CONTACT PERIODS	INTERNAL ASSESSMENT	TOTAL
75 @ 5 sessional contact periods per week for 15 weeks	10 periods	85 periods

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to develop the skills corresponding to the knowledge acquired in the theoretical subject ELECTRONICS DEVICE & CIRCUITS.

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – II Second Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – II Second Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

Job 1 To study the VI characteristics of a reverse biased Zener diode.

Job 2 To study the input and output characteristics and to find the h-parameters of a BJT for**:**
(a) C – E configuration; (b) C – C configuration; (c) C – B configuration.

Job 3 To study the FET characteristics.

Job 4 To study the rectifier with and without capacitor filter for**:**
(a) half-wave rectifier ;(b) full-wave rectifier; (c) bridge rectifier.

Job 5 Determination of frequency response characteristics of RC coupled amplifier circuit and calculation of bandwidth, midband gain, input impedance and out put impedance for**:**
(a) single stage amplifier; (b) double stage amplifier.

Job 6 To study the following applications of op-amp using IC741**:**
(a) adder; (b) subtractor; (c) differentiator (d) integrator; and, (e) voltage follower.

Job 7 To study the characteristics of IC555 timer connected as**:**
(a) astable multi-vibrator; (b) monostable multi-vibrator.

DETAILED SYLLABI OF THE DIFFERENT SUBJECTS OFFERED IN PART – III FIRST & SECOND SEMESTERS

INDUSTRIAL MANAGEMENT

Subject Code	Course offered in	Course Duration	3 lecture contact periods	Full Marks
IT / 5 / T1 / IMNT	Part – III First Semester	17 weeks	per week	75

OBJECTIVE

This subject provides the students of polytechnics with an exposure to the art and science of management principles, functions, techniques and skills that are essential for maximising attainment of the organisational goals with the available manpower and resources. Upon successful completion of this subject, the students shall be equipped with the fundamental knowledge of management which should make them confident in facing the challenges of their responsibilities in the different organisational scenarios.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	INTRODUCTION TO MANAGEMENT SCIENCE	5
	2	ORGANISATIONAL BEHAVIOUR	6
	3	HUMAN RESOURCES MANAGEMENT	8
B	4	PRODUCTION MANAGEMENT	9
	5	MATERIALS MANAGEMENT	3
	6	FINANCIAL MANAGEMENT	3
C	7	MARKETING & SALES MANAGEMENT	5
	8	QUANTITATIVE TECHNIQUES	6

CONTACT PERIODS: 45 **INTERNAL ASSESSMENT: 6** **TOTAL PERIODS: 51**

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	14	ANY 25	ONE	25 x 1 = 25	FOUR	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	5 X 10 = 50
B	4, 5, 6	11				THREE			
C	7, 8	8				TWO			

DETAIL COURSE CONTENT

GROUP - A — 19 PERIODS

Module 1 INTRODUCTION TO MANAGEMENT SCIENCE **5**

Principles & functions of management — Contributions of F.W. Taylor, Henry Fayol, Max Weber and Elton Mayo & Roethlisburger in development of the theories of management science.

Module 2 ORGANISATIONAL BEHAVIOUR **6**

Objectives — Brief introduction to: Motivation & Morale – Perception – Leadership & Leadership Styles – Communication – Team Building – Work Culture.

Module 3 HUMAN RESOURCES MANAGEMENT **8**

Scope & Functions – Human Resources Planning – Selection & Recruitment – Training & Development – Performance Appraisal – Industrial Safety.

GROUP - B — 15 PERIODS

Module 4 PRODUCTION MANAGEMENT **9**

PRODUCTION PLANNING: Routing – Loading – Scheduling — PRODUCTION CONTROL: Expediting – Dispatching — Materials Handling — Work Study — Productivity — QUALITY MANAGEMENT: Tools & Techniques – Quality Management System.

Module 5 MATERIALS MANAGEMENT **3**

OBJECTIVES & FUNCTIONS: Purchase function – Stores function — INVENTORY MANAGEMENT: ABC, VED analyses.

Module 6 FINANCIAL MANAGEMENT **3**

Financial Ratios — Elements of Costing — Auditing

GROUP - C **11 PERIODS**

Module 7 MARKETING & SALES MANAGEMENT **5**

Objectives & Functions — Marketing of products & Services — Advertising & Sales Promotion — Consumer Behaviour

Module 8 QUANTITATIVE TECHNIQUES **6**

Linear programming (graphical method only) — NETWORK ANALYSIS: PERT – CPM

REFERENCE BOOKS

1. Essentials of Management / Kontz / McGraw-Hill of India
2. Organization & Behaviour / M. Banerjee / Allied Publishers
3. Human Behaviour at Work: Organizational Behaviour / Keith Davis & Newstrom / McGraw-Hill of India
4. Human Resources Management / Mirza Saiyatain / Tata McGraw-Hill
5. Production Management & Control / Nikhil Bharat / U.N. Dhar & Co.
6. Production Management / Keith Lockyer / ELBS
7. Marketing Management / Philip Kolter / Prentice Hall of India
8. Lectures on Management Accounting / Dr. B.K. Basu / Basusri Bookstall, Kolkata
9. An Insight into Auditing: A Multi-dimensional Approach / Dr. B.K. Basu / Basusri Bookstall, Kolkata
10. Business Strategies, Financial Management & Management Accounting / S.K. Poddar / The Association of Engineers (India)

OPERATING SYSTEMS

Subject Code	Course offered in	Duration	4 lecture contact periods	Full Marks
IT / 5 / T2 / OS	Part – III First Semester	17 weeks	per week	75

OBJECTIVE

This subject intends to teach the student about the various functions of an operating system and how it is organized in various layers to perform different functions. These basic concepts can be used for a proper understanding of single-user and multi-user operating systems.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	INTRODUCTION	08
	2	PROCESS MANAGEMENT	15
	3	MEMORY MANAGEMENT	15
B	4	DEADLOCK	12
	5	FILE MANAGEMENT	10

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	21	ANY 25	1	1 x 25 = 25	SIX	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	10	10 X 5 = 50
B	4, 5	12				FOUR			

DETAIL COURSE CONTENT

GROUP – A 38 PERIODS

Module 1 INTRODUCTION 8

1.1 An Introduction to Operating System & its Services

1.2 Various Types of Operating Systems

1.3 Operating System Structure

1.4 Concepts of: Process – Files – System Calls – Interrupt – Shell

Module 2 PROCESS MANAGEMENT 15

2.1 An Introduction to process; Process State & Transition

2.2 Process Control Block, Process Context, Context Switch

2.3 Process Scheduling (Pre-emptive & Non-Pre-emptive Algorithms)

(a) FCFS (First Come First Served) Algo;
(b) Shortest Job First;
(c) Priority Scheduling;
(d) Round Robin Scheduling.

2.4 Performance Criteria of Scheduling Algorithm

(a) CPU Utilization;
(b) Throughput;
(c) Turnaround Time;
(d) Waiting Time;
(e) Response Time.

2.5 Overview of: Inter-process Communication – Race Condition – Critical Section – Semaphore

Module 3 MEMORY MANAGEMENT 15

3.1 Partitioned Memory Management (Static & Dynamic)

3.2 Concept of Fragmentation & Compaction

3.3 Paging & Demand Paging

3.4 Page Replacement Algorithms (FIFO, Optimal, LRU Algorithms)

GROUP – B 22 PERIODS

Module 4 DEADLOCK 12

4.1 Introduction to Deadlock

4.2 Necessary Condition for Deadlock

4.3 Method for Handling Deadlock

(a) Brief Overview of Deadlock Prevention;
(b) Deadlock Avoidance (Banker's Algorithm);
(c) Deadlock Detection & Recovery.

Module 5 FILE MANAGEMENT 10

5.1 File Concepts – Types of Files – File Attributes – File Operations

5.2 Access Methods: Sequential access – Random access

5.3 Hierarchical Directory System

REFERENCE BOOKS

1. Operating System Design & Implementation / Andres's Tanenbaum / Prentice Hall of India, N. Delhi
2. Operating Systems / Stuart E Mandnick & John J Donovan / McGraw-Hill

DATABASE MANAGEMENT SYSTEM

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 5 / T3 / DM	Part – III First Semester	17 weeks	per week	75

OBJECTIVE

Database is the prime area of Application Development. Business Application need to store & process large volume of data. This paper teaches the methodology of storing & processing data for commercial application. It also deals in the security and other aspects of Database Management System.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	BASIC CONCEPTS OF DBMS	07
	2	DATA MODELS	08
	3	RELATIONAL DATABASE	10
B	4	STRUCTURED QUERY LANGUAGE	10
	5	NORMALIZATION IN RELATIONAL SYSTEM	10
C	6	TRANSACTION PROSESS CONCEPTS	05
	7	CONCURRENCY CONTROL CONCEPTS	05
	8	SECURITY & INTEGRITY	05

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	14	ANY 25	ONE	1 x 25 = 25	FOUR	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	TEN	10 X 5 = 50
B	4, 5	11				THREE			
C	6, 7, 8	9				TWO			

DETAIL COURSE CONTENT

GROUP - A 25 PERIODS

Module 1 BASIC CONCEPTS OF DBMS 7

Purpose of database systems – Data abstraction – Database Users – Data Independence (Logical & Physical) – Instance & Schemes – Data Dictionary – Three layered Architecture of DBMS.

Module 2 DATA MODELS 8

LOGICAL MODELS: Object & Record based – Object oriented model – Entity relationship models – Entity sets & relationships sets – Attributes — KEYS in entity & relationship sets: (a) super key, (b) candidate key, (c) primary key, (d) unique key — Mapping constraints – E-R Diagrams – Relational Model – Hierarchical model – Network Model.

Module 3 RELATIONAL DATABASE 10

Data definition language – Data manipulation language – Relational algebra — OPERATORS: select, project, join, rename etc – Simple examples.

GROUP - B 20 PERIODS

Module 4 STRUCTURED QUERY LANGUAGE 10

Give elementary idea of Structured Query Language – Queries in SQL – Queries to create, insert, update, select in SQL.

Module 5 NORMALIZATION IN RELATION SYSTEM 10

Pitfalls in relation databases – Functional Dependencies – Lossless join and Dependency Preservation – Importance of normalization – 1^{st} NF, 2^{nd} NF, 3^{rd} NF and comparison with each other – BCNF – Multi-valued Dependency & 4^{th} NF (Elementary idea).

GROUP - C 15 PERIODS

Module 6 TRANSACTION PROCESSING CONCEPTS 5

Transaction processing – Transaction & System Concepts – Desirable properties of transaction – Schedules & Recoverability.

Module 7 CONCURRENCY CONTROL CONCEPTS 5

Basic concepts of concurrency control – Concepts of locks – Live Lock – Deadlock – Serializability (only fundamentals).

Module 8 SECURITY & INTEGRITY 5

Authorization and View – Security constraints – Integrity Constraints – Encryption.

REFERENCE BOOKS

1. An Introduction to Database Systems / C.J. Date
2. Database System Concepts / A. Silberschatz & H.F. Korth
3. Database Concepts and Systems / Ivan Bayross / SPD
4. Fundamental of Database System / R. Elmashri & S.B. Navathe.

PRINCIPLE OF COMMUNICATION

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 5 / T4 / POC	Part – III First Semester	17 weeks	per week	75

OBJECTIVE

Communication is backbone of modern Technology. In this subject the student are exposed to basics of communication, etc. This paper is the pre-requisite for Computer Network and Advanced Communication.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	INTRODUCTION TO COMMUNICATION	08
	2	AMPLITUDE MODULATION SYSTEM	10
	3	FREQUENCY & PHASE MODULATION SYSTEM	10
B	4	PULE MODULATION SYSTEM	10
	5	DIGITAL COMMUNICATION	15
	6	BASIC TELEPHONY	07

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	16	ANY 25	ONE	1 x 25 = 25	FIVE	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	4, 5, 6	18				FOUR			

DETAIL COURSE CONTENT

GROUP - A 28 PERIODS

Module 1 INTRODUCTION TO COMMUNICATION 8

Importance of communication — Elements of communication system — Signal, Spectrum and Bandwidth — Basic idea of Fourier series and Fourier Transform — Discrete and continues spectra of periodic and aperiodic signal and corresponding discussion of Fourier series and Fourier transform — Transfer Function — Filter.

Module 2 AMPLITUDE MODULATION SYSTEM 10

Need of Modulation — Amplitude Modulation — Expression for Amplitude Modulation and Signal Power relation in AM wave — Modulator and Balanced Modulator — SSB Signal: Methods of generation of SSB Signal (Filter method), Vestigial side band signal, Concept of multiplexing, AM demodulators (Linear diode detector, Square law detector, Envelop detector) — Principle of radio transmission using block diagram (Super Heterodyne Receiver).

Module 3 FREQUENCY & PHASE MODULATION SYSTEM 10

Frequency Modulation — Phase Modulation — Expression for frequency and phase modulated signal — Frequency spectrum and effective bandwidth of FM signal (Carson's Rule) — Comparison between AM, FM, PM — Methods of FM generation (Direct, Indirect, Armstrong Method) — Different methods of FM demodulation (schematic discussion on Foster Seeley discriminator, Ratio detector) — Voltage Controlled Oscillator and Phase Lock Loop.

GROUP - B 32 PERIODS

Module 4 PULSE MODULATION SYSTEM 10

Pulse modulation system — Noisy communication channel — Sampling theorem and classify sampling — PAM, PWM, PPM.

Module 5 DIGITAL COMMUNICATION 15

Digital communication — Advantages of digital communication — Channel capacity formula — Basic concept of Matched Filter — Binary ASK, PSK, FSK — QASK and QPSK — TDM and FDM — PCM generation and demodulation — SNR formula for PCM — Bandwidth of PCM signal — Concept of SNR-Bandwidth trade-off in PCM — Concept of DM & ADM — DPCM.

Module 6 BASIC TELEPHONY 7

Basic telephone circuitry — Telephone Transmitter, Receiver, Dial Tone, Side Tone, etc. — DTMF — Concept of strowger exchange — Electronic Exchange.

REFERENCE BOOKS

1. Electronic Communication by G. Kennedy
2. Principle of Communication by Taub & Schilling
3. Modern Electronic Communication by A. Sharma & R.K. Sinha.

AUTOMATA THEORY

Subject Code	Course offered in	Course Duration	3 lecture contact periods	Full Marks
IT / 5 / T5 / AMTY	Part – III First Semester	17 weeks	per week	75

OBJECTIVE

Students through this paper will enhance their knowledge in mathematical models of programming languages, computers and capability of a computer.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	MATHEMATICAL PRELIMINARIES	05
	2	THE THEORY OF AUTOMATA	10
	3	FORMAL LANGUAGE	10
B	4	REGULAR SETS & REGULAR GRAMMAR	12
	5	CONTEXT-FREE LANGUAGES	04
	6	PUSHDOWN AUTOMATA & TURING MACHINE	04

CONTACT PERIODS: 45 INTERNAL ASSESSMENT: 6 TOTAL PERIODS: 51

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	17	ANY 25	ONE	1 x 25 = 25	FIVE	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	4, 5, 6	15				FOUR			

DETAIL COURSE CONTENT

GROUP - A — 25 PERIODS

Module 7 MATHEMATICAL PRELIMINARIES 5

1.1 Sets, Relations and Functions (Brief Discussion), Graphs, Trees.

1.2 Strings and their properties: Definition, operation on strings, palindrome, prefix & suffix of a string, Levi theorem (Statement only), Terminal & Non-terminal symbols.

Module 8 THE THEORY OF AUTOMATA 10

2.1 Definition of an Automaton, Definition of finite Automaton, Block diagram of finite Automaton, Transition system, Properties of Transition Functions, Acceptability of a string by Finite Automaton.

2.2 Definition of DFA and NDFA, The equivalence of DFA and NDFA, A theorem on equivalence of DFA and NDFA. (Including Applications)

2.3 Mealy and Moore machine, Procedure for Transforming a Mealy Machine into a Moore Machine (with applications), Procedure for Transforming a Moore Machine to a Mealy Machine (with applications).

Module 9 FORMAL LANGUAGE 10

3.1 Concept of a language, Definition of a grammar, Language generated by a grammar (definition with application).

3.2 Chomsky classification of languages (definition), Relation between the classified languages.

3.3 Procedure, Algorithm, Recursive and recursively enumerable set (definitions); Theorem related CSL and recursive set (statement only).

GROUP - B — 20 PERIODS

Module 10 REGULAR SETS & REGULAR GRAMMAR 12

4.1 Definition of Regular expression and regular set, Identities of regular expressions, Arden's theorem (statement & application)

4.2 Relation between regular expression and finite automata, Transition system containing /\-mores (application), Conversion of Non-deterministic systems to deterministic system (application), Construction of finite automata equivalent to a regular expression (with application), Equivalence of two finite automata (application), Equivalence of two regular expressions; Pumping lemma (Statement & application), Closure properties of regular sets, Construction of regular grammar for a given DFA and a transition system for a given regular grammar G.

Module 11 CONTEXT-FREE LANGUAGES 4

Introduction – Definition – Derivation trees (Definitions & application) – Ambiguity in CFG.

Module 12 PUSHDOWN AUTOMATA & TURING MACHINE 4

Basic definition of PDA – Turning machine model & its representation.

REFERENCES

1. Introduction to Automata Theory, languages & computation / J.E. Hopcroft & J.D. Ulman / Narosa
2. Theory of Computer Science / K.L.P. Mishra & N. Chandrasekharan / PHI
3. Theory of Automata and Formal Language / Kain / TMH
4. Switching and Finite Automata / Z.V.I. Kohavi / TMH.

ADVANCED SOFTWARE LAB

Subject Code	Course offered in	Course Duration	5 sessional contact periods	Full Marks
IT / 5 / S1 / ASWL	Part – III First Semester	17 weeks	per week	100

OBJECTIVE

This present course entitled *Advanced Software Lab* basically deals with Java Programming and HTML. *Java Programming* is a full fledged object-oriented programming environment which is a distributed, interpreted, robust, secure, architecture-neutral, portable, high performance, multi-threaded and dynamic language. On successful completion of the same, a student will be able to get ideas of Internet Programming Methodologies, and, to know why it is embedded in web documents. Whereas on successful completion of *HTML*, a student will be able to get a brief knowledge of Internet Technology and that of web page design.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A (JAVA)	1	JAVA PROGRAMMING FUNDAMENTALS	03
	2	DATA TYPES, VARIABLES OPERATORS & ARRAYS	06
	3	CONTROL STATEMENTS & LOOPING STRUCTURE	03
	4	CLASSES, OBJECTS & METHODS	12
	5	INHERITANCE & EXTENDING CLASSES(INTERFACE)	12
	6	EXCEPTION HANDLING	03
	7	THREAD & MULTI-THREAD	08
	8	JAVA NETWORKING	10
	9	DATA BASE CONNECTIVITY : JDBC	06
B (HTML)	10	HTML BASICS	03
	11	FONTS ,COLOR ,LISTS & TABLES	06
	12	HYPER LINKS ,FRAMES & IMAGES	03

CONTACT PERIODS: 75 **INTERNAL ASSESSMENT: 10** **TOTAL PERIODS: 85**

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout the Part – III First Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of the Part – III First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

GROUP – A JAVA 63 PERIODS

Module 1 JAVA PROGRAMMING FUNDAMENTALS 3

To write a Java application program which clarify the following points:

(i) How to compile and run,
(ii) How to set path and classpath,
(iii) Single and Multi-line comments, and,
(iv) Command line arguments.

Module 2 DATA TYPES, VARIABLES OPERATORS & ARRAYS 6

2.1 To write a Java program which defines and initialized different data types: byte, short, int, long, float & double and clarify the following points: (a) dynamic initialization, (b) type conversion and casting.
2.2 Problems related to Character and Boolean data type.
2.3 Problems related to one and two dimensional array.
2.4 Problems related to Arithmetic, bit wise and relational operators.

Module 3 CONTROL STATEMENTS & LOOPING STRUCTURE 3

3.1 Problems related to: IF-ELSE, IF-ELSE-IF, SWITCH statements.
3.2 Problems related to the following looping statements — WHILE, DO-WHILE & FOR.
3.3 Problems related to nested looping and jump statements (BREAK, CONTINUE & RETURN)

Module 4 CLASSES, OBJECTS & METHODS 12

4.1 To write a Java program to clarify the following points: (a) how to declare a class, (b) how to create an object, (c) how methods are defining in a class, (d) access variables and methods.

4.2 To construct a Java program which defines: (a) how arguments values are passed to a method, (b) use of new operator, constructor and finalize) method, (c) passing objects to a method, (d) declaration of static keyword.

4.3 To practice problems related to: (a) Method overloading, (b) Multiple constructor, (c) Calling constructor from a constructor.

Module 5 INHERITANCE & EXTENDING CLASSES (INTERFACE) 12

5.1 To write Java programs which clarify the following: (a) super class, (b) sub-class / derive class, (c) understanding abstract and final class, (d) polymorphism.

5.2 To practice problems related to: (a) Multiple Inheritance, (b) Interface, (c) Extending Interfaces.

Module 6 EXCEPTION HANDLING 3

To write a Java program which is constructed using TRY, CATCH and FINALLY blocks.

Module 7 THREAD & MULTI-THREAD 8

7.1 To practice problems related to main thread, sub-threads and thread priorities.

7.2 To practice problems related to thread synchronization and inter-thread communication.

Module 8 JAVA NETWORKING 10

8.1 To write a Java program which displays the: (a) IP address of a corresponding host name, (b) Different parts of an URL (e.g. Protocol, Port no, hostname, Filename).

8.2 To practice problems related to Socket programming (minimum two problems).

Module 9 DATA BASE CONNECTIVITY : JDBC 6

9.1 To practice problems related to data base connection using JDBC: ODBC bridging driver.

9.2 To write a Java program which connects to the data base (Access / Oracle) and displays the output.

GROUP – B HTML 12 PERIODS

Module 10 HTML BASICS 3

10.1 To create an HTML document with the main structure elements (HTML, HEAD, BODY), save it and display it on a browser.

10.2 To create an HTML document and add the following: (a) Comments, (b) Headings (H1 to H6), (c) Paragraph, (d) Visual line break.

Module 11 FONTS ,COLOUR ,LISTS & TABLES 6

11.1 To create an HTML document and add the following: (a) Fonts, (b) Colours, (c) Lists, (d) Signature Text blocks.

11.2 To create in an HTML document a Table and mention the following: (a) Table variables, (b) Table element, (c) CAPTION element, (d) Table ROW element, (e) Table Data element, (f) Table Heading element.

Module 12 HYPER LINKS ,FRAMES & IMAGES 3

To create a web page using HTML and clarify the following: (a) how to create HYPERLINK, (b) how to create FRAMES, (c) how to Insert an IMAGE.

REFERENCE BOOKS

1. JAVA 2: The Complete Reference / Herbert Schildt / Tata Mc-Graw Hill Pub. Co. Ltd.
2. Head First Java / K. Sierra & B. Bates , O'Reilly
3. Internet and Java Programming / R. Krishnamoorthy & S. Prabhu / New Age International (p) Ltd.
4. Beginning Java 2 / Ivor Horton / Wrox Press Ltd (SPD)
5. Beginning Java Networking / C. Darby, J. Griffin and others / Wrox Press Ltd. (SPD)
6. Teach yourself Web Technologies Part – I / Ivan Bayross / BPB Publications
7. Teach yourself Web Technologies Part – II / Ivan Bayross / BPB Publications
8. Java foundations of programming / Prentice Hall of India Pvt. Ltd.
9. HTML: The Complete Reference / Thomas A. Powell / Tata Mc-Graw Hill Pub. Co. Ltd.
10. HTML and XML an Introduction / Prentice Hall of India Pvt. Ltd.
11. Internet: An Introduction / Tata Mc-Graw Hill Pub. Co. Ltd.

OPERATING SYSTEMS LAB

Subject Code	Course offered in	Course Duration	4 sessional contact periods	Full Marks
IT / 5 / S2 / LOS	Part – III First Semester	17 weeks	per week	100

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to develop the skills corresponding to the knowledge acquired in the theoretical subject OPERATING SYSTEMS.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPICS	CONTACT PERIODS
GROUP – A (WINDOWS – NT / 2000) 25 PERIODS	1	OVERVIEW OF WINDOWS – NT / 2000	5
	2	WINDOWS NT / 2000 BASICS	5
	3	WINDOWS INSTALLATION	5
	4	NT / 2000 ADMINISTRATION	10
GROUP – B (UNIX) 35 PERIODS	5	OVERVIEW OF UNIX	5
	6	BASIC UNIX COMMANDS	10
	7	SYSTEM ADMINISTRATION	10
	8	SHELL PROGRAMMING	10

CONTACT PERIODS: 60 **INTERNAL ASSESSMENT: 8** **TOTAL PERIODS: 68**

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout the Part – III First Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – III First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

GROUP – A WINDOWS – NT / 2000 40 PERIODS

Module 1 OVERVIEW OF WINDOWS – NT / 2000 5

i) NT / 2000 Features, NT / 2000 Capabilities - Multitasking, Multithreading, Multiprocessor Support.
ii) NT / 2000 File System, Client/Server Model.

Module 2 WINDOWS NT / 2000 BASICS 5

i) Starting & Quitting Windows NT / 2000
ii) Viewing Contents Of Your System
iii) Opening, Closing, Switching Between Programs
iv) Organizing Files & Folders
v) Installing Software Programs.

Module 3 WINDOWS INSTALLATION 5

i) NT / 2000 Hardware Requirements.
ii) NT / 2000 Server Installation & Configuration.
iii) NT / 2000 Workstation Installation & Configuration.

Module 4 NT / 2000 ADMINISTRATION 10

i) Creating a New User , Adding an Account to a Group
ii) Creating permission for a system resources.
iii) Using Task Manager.
iv) Compressing & Uncompressing Disk.
v) Using Event Viewer: (a) application log, (b) security log.
vi) Using Performance Monitor.

GROUP – B UNIX 35 PERIODS

Module 5 OVERVIEW OF UNIX 5

UNIX as an operating system – Kernel – Shell – User – UNIX File System – Files & Directory – File System Hierarchy.

Module 6 BASIC UNIX COMMANDS 10

i) Listing Files & Directories.
ii) Copying, Deleting, Renaming, Comparing, Splitting, Linking Files.
iii) Creating, Navigating, Removing Directories.
iv) Setting Access permission of files & directories.
v) Using VI editor of UNIX.
vi) Paging & Printing Files.
vii) Status of users terminals & setting terminal Characteristics.
viii) Cutting, Pesting, Sorting of Files.
ix) Searching for a pattern in string.
x) Process Status, Process Killing

Module 7 SYSTEM ADMINISTRATION 10

i) Adding & Modifying Users accounts, Controlling Password.
ii) Creating & Mounting File System.
iii) init process & inittab startup files, Run levels.
iv) Managing Disk Space(df , du , cpio)
v) Searching Files with find command
vi) Using ftp protocol to move files between computers.
vii) 'Shutdown' command.

Module 8 SHELL PROGRAMMING 10

i) Shell Script
ii) System variables & shell variables.
iii) Shell termination.
iv) Looping statements; conditional statements; case statements.
v) Logical operators, Mathematical expression.
vi) Command line parameters – Positional parameters.
vii) String handling.

DATABASE MANAGEMENT SYSTEMS LAB

Subject Code	Course offered in	Course Duration	4 sessional contact periods	Full Marks
IT / 5 / S4 / LDM	Part – III First Semester	17 weeks	per week	100

OBJECTIVE

On Satisfactory completion of the course, the students should be in a position to develop skills corresponding to the knowledge acquired in the theoretical subject DATABASE MANAGEMENT SYSTEM.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPICS	CONTACT PERIODS
1	INTRODUCTION TO ORACLE	12
2	UNDERSTANDING PL / SQL	12
3	WORKING WITH FORMS	20
4	WORKING WITH MENU	8
5	WORKING WITH REPORT	8

CONTACT PERIODS: 60 INTERNAL ASSESSMENT:8 TOTAL PERIODS: 68

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – III First Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.

2. **External Assessment of 50 marks** shall be held at the end of Part – III First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

Module 1 INTRODUCTION TO ORACLE 12

Introduction to oracle — Various Data types — Creating Tables, Modifying structure of tables — Inserting, Updating, Deleting table data — Many faces of SELECT command — Data Constraints — Logical operators, Range Searching , Pattern Matching, Oracle Function — Grouping data from tables — Views — JOINS: Equi-Join, Self-Join.

Module 2 UNDERSTANDING PL / SQL 12

Introduction to PL/SQL — PL/SQL Syntax and PL/SQL execution environment — Variables and Various Data types — Understanding PL/SQL block structure — ERROR HANDLING IN PL/SQL: (a) user defined error condition, and, (b) pre-defined internal PL/SQL exception — Introduction to cursor — CURSOR CONTROL: open, fetch, close statements — Implicit & Explicit cursor and their attributes.

Module 3 WORKING WITH FORMS 20

Basic Components of Form — Understanding Block, Item, Frame, Canvas View, Window, PL/SQL Code — Form construction, Default Form, Customizing Form layout — Standard data retrieval and data manipulation operation using form — Understanding and using Triggers and user-defined procedure — Form data validation — Context sensitive help — Constructing master-detail form — Using LOV and list items — Working with Multiple Canvases — Passing parameter between forms.

Module 4 WORKING WITH MENU 8

Components of custom menu — Creating custom menu & menu module — Attaching PL / SQL code to menu items — Saving & Compiling a menu module — Attaching menu module to form module.

Module 5 WORKING WITH REPORT 8

Basic Concepts — Using Oracle report interface — Creating default tabular report — Customizing report layout — Familiarity with Break & Matrix report.

REFERENCE BOOKS

1. ORACLE DEVELOPER 2000 / Ivan Bayross.

PRINCIPLE OF COMMUNICATION LAB

Subject Code	Course offered in	Course Duration	Full Marks
IT / 5 / S5 / LPOC	Part – III First Semester	17 weeks	100

CONTACT PERIODS	INTERNAL ASSESSMENT	TOTAL
60 @ 4 sessional contact periods per week for 15 weeks	8 periods	68 periods

OBJECTIVE

On Satisfactory completion of the course, the students should be in a position to develop skills corresponding to the knowledge acquired in the theoretical subject PRINCIPLE OF COMMUNICATION.

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout Part – III First Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External Assessment of 50 marks** shall be held at the end of Part – III First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot job – 25, Viva-voce – 25.

DETAIL COURSE CONTENT

1. Study of Amplitude Modulation and Demodulation technique.
   a) Main parameter of A.M. signal through oscilloscope.
   b) Envelop Detector.

c) Design of simple Balanced Modulator using 4-diode switching.
d) Design of envelop detector.

2. Study of Frequency Modulation & Demodulation.
   a) FM modulation using VCO.
   b) Frequency Division and Modulation Index.
   c) Operation of FM Detector and FM Demodulation Techniques.

3. Study of Pulse Modulation.
   a) PWM and its wave form.
   b) Generation of PPM and PWM.

4. Studies of different digital modulation.
   a. ASK, FSK, QPSK, etc.
   b. Performance study of different digital communication system like PCM, DM, ADM.
   c. Complete PCM system – Codec based on Microprocessor or Digital Circuit.
   d. Complete DM modulator using digital circuit.

5. Detection of pulse dialling, tone dialling, reversal on a telephone line using hybrid circuit.

COMPUTER NETWORKS

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 6 / T1 / CONW	Part – III Second Semester	17 weeks	per week	75

OBJECTIVE

On successful completion of this course, a student will:

(i) be able to know how internetworking works,
(ii) get idea of different media,
(iii) have knowledge about different types of networking,
(iv) get idea of different types of protocols and standards,
(v) gain knowledge of network security.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	INTRODUCTION TO COMPUTER NETWORKS	6
	2	NETWORK TOPOLOGY (PHYSICAL & LOGICAL)	2
	3	TRANSMISSION MEDIA & SWITCHING	7
	4	MODES OF DATA TRANSMISSION & MULTIPLEXING	6
B	5	NETWORK REFERENCE MODEL, PROTOCOLS, SERVICES & STANDARDS	12
	6	DEVICES OF NETWORK & INTER-NETWORK CONNECTIVITY	8
	7	FLOW CONTROL, ERROR CONTROL & NOISE	8
C	8	APPLICATION & STANDARDS OF LAN	4
	9	INTERNET	3
	10	NETWORK SECURITY	4
CONTACT PERIODS: 60		INTERNAL ASSESSMENT: 8	TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3, 4	12	ANY 25	ONE	1 x 25 = 25	THREE	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	5, 6, 7	15				FOUR			
C	8, 9, 10	7				TWO			

DETAIL COURSE CONTENT

GROUP - A 21 PERIODS

Module 1 INTRODUCTION TO COMPUTER NETWORKS 6

1.1 BASIC CONCEPTS: Servers, Client, Workstation, Hosts (definition & applications)

1.2 TYPES OF COMPUTER NETWORKS: LAN, MAN and WAN.

1.3 TYPES NETWORK ARCHITECTURE: Peer-to-peer, Client-Server, Distributed.

Module 2 NETWORK TOPOLOGY (PHYSICAL & LOGICAL) 2

Bus, Ring, Star, Mesh and Tree.

Module 3 TRANSMISSION MEDIA & SWITCHING 7

3.1 GUIDED: Coaxial, Twisted-pair (UTP, STP), fibre-optics cable.

3.2 UNGUIDED: Line of site transmission and communication satellites.

3.3 SWITCHING: Circuit Switching, Packet Switching, Message Switching.

Module 4 MODES OF DATA TRANSMISSION & MULTIPLEXING 6

4.1 Parallel and Serial, Asynchronous and Synchronous

4.2 Simplex, Half duplex and Full duplex

4.3 FDM, TDM and Inverse Multiplexing.

GROUP - B 28 PERIODS

Module 5 NETWORK REFERENCE MODEL, PROTOCOLS, SERVICES & STANDARDS 12

5.1 OSI reference model of Data Communication and its different layers.

5.2 Protocols, Services and Standards (in brief): TCP, FTP, TELNET, RPC, DNS, ICMP, IP (IP addressing, Subnet masking), FDDI, X.25, ISDN (Architecture and different channel specifications only), ATP.

Module 6 DEVICES OF NETWORK & INTER-NETWORK CONNECTIVITY 8

Repeater, Bridge, Router (router concepts, least-cost routing, non-adaptive and adaptive routing, distance vector and link state routing), switches (store and forward and cut through), Gateways, Modem.

Module 7 FLOW CONTROL, ERROR CONTROL & NOISE 8

7.1 FLOW CONTROL: Stop-and-wait, Sliding window

7.2 ERROR CONTROL: Stop-and-wait ARQ: Piggybacking, Sliding window ARQ: Go-back-n, selective-reject.

7.3 NOISE: Definition and different types of Noise, Nyquist rate, Shannon's Capacity.

GROUP - C 11 PERIODS

Module 8 APPLICATION & STANDARDS OF LAN 4

Ethernet (Thick, Thin, Twisted pair) – VLAN

Module 9 INTERNET 3

Definition of Internet and compare with Intranet – URL – HTTP – HTML.

Module 10 NETWORK SECURITY 4

Encryption (Private and Public key) – Decryption – Digital Signature.

REFERENCE BOOKS

1. Data Communications and Networking / B.A. Forouzan / Tata McGraw Hill
2. Data and Computer Communications / William Stallings / Prentice Hall of India
3. Data Networking Communication / M.A. Miller / Vikas Publishing House
4. Networking Protocols and Standards / Prentice Hall of India
5. Encyclopaedia of Networking / M. Tulloch / Prentice Hall of India
6. Basics of Network Security / Firewalls and VPNs / Prentice Hall of India
7. TCP/IP Protocol suite / B.A. Forouzan / Tata McGraw Hill
8. Data Communications / P.C. Gupta / Prentice Hall of India

SYSTEM PROGRAMMING

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 6 / T2 / SYPR	Part – III Second Semester	17 weeks	per week	75

OBJECTIVE

System Programs, viz. compilers, loaders, macro processors, operating systems, were developed to make computers better adapted to the need of their users. Further, people want more assistance in mechanics of preparing their programs. System Programming teaches the procedures for the design of software systems and provides a basis for judgement in the design of software.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPICS	CONTACT PERIODS
A	1	LANGUAGE PROCESSORS	5
	2	MACHINE STRUCTURE, MACHINE LANGUAGE & ASSEMBLY LANGUAGE	5
B	3	ASSEMBLERS	10
	4	MACRO LANGUAGE & MACRO PROCESSOR	10
C	5	LOADERS & LINKERS	14
	6	COMPILERS & INTERPRETERS	16

CONTACT PERIODS: 60 **INTERNAL ASSESSMENT: 08** **TOTAL PERIODS: 68**

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2	6	ANY 25	ONE	1 x 25 = 25	TWO	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	TEN	10 X 5 = 50
B	3, 4	21				THREE			
C	5, 6	16				FOUR			

DETAIL COURSE CONTENT

GROUP - A — 10 PERIODS

Module 1 LANGUAGE PROCESSORS 5

Introduction — EVOLUTION OF THE COMPONENTS OF A PROGRAMMING SYSTEM: Assemblers, loaders, macros, compilers, formal systems — Language processing activities — Fundamentals of language processing & specification.

Module 2 MACHINE STRUCTURE, MACHINE LANGUAGE & ASSEMBLY LANGUAGE 5

General MACHINE STRUCTURE — MACHINE LANGUAGE: Long way, no looping, address modification using instructions as data, address modification using index registers — ASSEMBLY LANGUAGE Programs (using Literals also).

GROUP - B — 20 PERIODS

Module 3 ASSEMBLERS 10

Elements of Assembly Language Programming — General Design Procedure of System Software — DESIGN SPECIFICATION of an Assembler: Synthesis & Analysis phase — PASS STRUCTURE of an Assembler: Two-pass translation — DESIGN of a Two-pass assembler: data structures & algorithms.

Module 4 MACRO LANGUAGE & MACRO PROCESSOR 10

MACRO INSTRUCTIONS — FEATURES OF A MACRO FACILITY: Macro definition & call – Macro expansion – Nested macro calls – Advanced macro facilities: conditional macro expansion, time loops expansion, semantic expansion — DESIGN of a Two-pass Macro Processor: data structures & algorithms.

GROUP - C — 30 PERIODS

Module 5 LOADERS & LINKERS 14

BASIC LOADER FUNCTIONS — ABSOLUTE LOADER: Design — BOOTSTRAP LOADER: Overview — MACHINE-DEPENDENT LOADER FEATURES: Relocation, program linking, tables and logic for a linking loader — MACHINE-

INDEPENDENT LOADER FEATURES: Automatic library search, loader options, overlay programs — DIRECT-LINKING LOADER: Concepts & Algorithm — RELOCATION & LINKING Concepts — Concepts of OVERLAYS.

Module 6 COMPILERS & INTERPRETERS 16

ASPECTS OF COMPILATION — MEMORY ALLOCATION — BASIC COMPILER FUNCTIONS: Grammars, Lexical analysis, Syntactic analysis, Code generation — COMPILER CONSTRUCTION: seven phases — COMPILATION OF EXPRESSIONS — COMPILATION OF CONTROL STRUCTURE — CODE OPTIMIZATION: Machine-independent and Machine-dependent — INTERPRETERS: Use of interpreters, Overview of interpretation.

REFERENCE BOOKS

1. Systems Programming / John J. Donovan / Tata McGraw Hill
2. Systems Programming and Operating Systems / D.M. Dhamdhere / Tata McGraw Hill

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SOFTWARE ENGINEERING

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 6 / T3 / SWEN	Part – III First Semester	17 weeks	per week	75

OBJECTIVE

As Computing Systems become more numerous, more complex, and more deeply embedded in modern society, the need for systematic approaches to Software development and Software maintenance becomes increasingly apparent. Software Engineering is the field of study concerned with this emerging technology.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	SOFTWARE ENGINEERING PARADIGMS	06
	2	SOFTWARE COST ESTIMATION	06
	3	SOFTWARE REQUIREMENT ANALYSIS	08
B	4	SOFTWARE DESIGN	10
	5	PROGRAMMING LANGUAGES & CODING	05
	6	SOFTWARE TESTING	06
C	7	SOFTWARE QUALITY ASSURANCE, VERIFICATION & VALIDATION	06
	8	SOFTWARE MAINTENANCE	05
	9	SOFTWARE DOCUMENTATION	02
	10	SOFTWARE PROCESS MANAGEMENT	06

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 08 TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	11	ANY 25	ONE	1 x 25 = 25	THREE	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	TEN	10 X 5 = 50
B	4, 5, 6	12				THREE			
C	7, 8, 9, 10	10				THREE			

DETAIL COURSE CONTENT

GROUP - A 20 PERIODS

Module 1 SOFTWARE ENGINEERING PARADIGMS 6

The evolving role of Software – An industry perspective and Software competitiveness.
Software Crisis – Problems and Causes.
Generic Process Model – Linear Life Cycle Model, Spiral Model, Prototype Model, Iterative Model.

Module 2 SOFTWARE COST ESTIMATION 6

Software Cost Factors; Software Cost Estimation Techniques – Expert Judgment, Delphi-Cost Estimation; COCOMO – a heuristic estimation technique.

Module 3 SOFTWARE REQUIREMENT ANALYSIS 8

Requirement Process; Problem Analysis – Informal approach, structured analysis, object-oriented modelling, prototyping; Software Requirement Specification (SRS).

GROUP - B 21 PERIODS

Module 4 SOFTWARE DESIGN 10

Design and Software quality; Evolution of software design; Fundamental Design concepts- Abstraction, Refinement, Information hiding, Structure, Modularity, Software architecture, Data structure, Concurrency, Verification; Effective Modular Design – Functional independence, Cohesion, Coupling; Basic concepts of Data Flow-Oriented Design & Object-Oriented Design.

Module 5 PROGRAMMING LANGUAGES & CODING 5

Programming Languages Features – Type checking, separate compilation, User Defined Data types, Data abstraction, Exception handling;
Structured Coding Techniques; Coding Styles; Coding Standards and Guidelines; Documentation Guidelines;

Module 6 SOFTWARE TESTING 6

Testing Objectives; Testing principles; Testability; Walkthrough, Symbolic Execution & Inspection; Black-Box testing; White-Box testing; Software Testing Strategies – Unit testing, Integration testing, Validation testing, System testing; Debugging approaches.

GROUP - C 19 PERIODS

Module 7 SOFTWARE QUALITY ASSURANCE, VERIFICATION & VALIDATION 6

Software quality factors; Software Quality Assurance (SQA); SQA activities; Software reliability – errors and faults; Software reliability models; A framework for technical software metrics;

Module 8 SOFTWARE MAINTENANCE 5

Enhancing maintainability during development; Managerial aspects of Software Maintenance; Software Configuration management; Software Maintenance activities – Corrective, Adaptive, Perfective, preventive; Estimating Software Maintenance Cost;

Module 9 SOFTWARE DOCUMENTATION 2

Module 10 SOFTWARE PROCESS MANAGEMENT 6

Concepts of Software Process Management; Objectives; Scope; Planning; Estimation; Risk analysis; Scheduling; Software process and project metrics;

REFERENCE BOOKS

1. Software Engineering, A Practitioner's Approach / Roger S. Pressman / McGraw-Hill
2. Software Engineering Concepts / Richard E. Fairly / Tata McGraw Hill
3. Software Engineering Principles and Practice / Hans Van Vlient / Wiley
4. An Integrated Approach to Software Engineering / Pankaj Jalote / Narosa Pub. House
5. Fundamental of Software Engineering / Rajib Mall / Prentice Hall of India.

ADVANCED COMMUNICATION

Subject Code	Course offered in	Course Duration	4 lecture contact periods	Full Marks
IT / 6 / T4 / ADCM	Part – III First Semester	17 weeks	per week	75

OBJECTIVE

As Computing Systems become more numerous, more complex, and more deeply embedded in modern society, the need for systematic approaches to Software development and Software maintenance becomes increasingly apparent. Software Engineering is the field of study concerned with this emerging technology.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	MICROWAVE ANTENNA & WAVE PROPAGATION	14
	2	RADIO RECEPTION	07
B	3	SATELLITE & SPACE COMMUNICATION	10
	4	OPTICAL FIBER COMMUNICATION	10
C	5	INTRODUCTION TO WIRELESS, CELLULAR, DIGITAL & MOBILE	07
	6	SPREAD SPECTRUM SYSTEM	07
	7	CELLULAR AND WIRELESS SYSTEM ENGINEERING	05
CONTACT PERIODS: 60		INTERNAL ASSESSMENT: 08	TOTAL PERIODS: 68

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2	12	ANY 25	ONE	1 x 25 = 25	THREE	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	TEN	10 X 5 = 50
B	3, 4	11				THREE			
C	5, 6, 7	11				THREE			

DETAIL COURSE CONTENT

GROUP - A — 21 PERIODS

Module 1 MICROWAVE ANTENNA & WAVE PROPAGATION — 14

1.1 Need of antenna in communication systems.
1.2 Microwave antenna
- Characteristic & typical application of parabolic reflectors.
- Characteristic & typical application of horns, lens & slot antenna.

1.3 Wave propagation
- Propagation mode for different frequency.
- Salient features of ground, sky and space wave propagation.
- Line-of-sight propagation.
- Effect of the atmosphere & curvature.
- Repeaters, fading, diversity reception.

Module 2 RADIO RECEPTION — 7

2.1 Concept of heterodyning and block diagram & critical explanation super heterodyning receiver.
2.2 Block schematic diagram and operational description of an AM receiver.
2.3 Sensitivity, selectivity & fidelity of a receiver.
2.4 Working principle of AM and FM systems.

GROUP - B — 20 PERIODS

Module 3 SATELLITE & SPACE COMMUNICATION — 10

3.1 Introduction and brief history.
3.2 Orbits of satellite – low, medium and geo synchronous.
3.3 Satellite links.
3.4 Synchronisation
- Principle of frequency division multiple access (FDMA)

Spade system, time division multiple access (TDMA)
Spread spectrum multiple access (SSMA)
Basic principle of VSAT.

Module 4 OPTICAL FIBRE COMMUNICATION 10

4.1 History of Fibre Optics.
4.2 Principles of fibber optics communication.
4.3 Optical fibber and fibber cables, fibber characteristics & classification.
4.4 Brief idea of components of optical fibber communication system and representation by block diagram.
4.5 Insulation, testing & repair.

GROUP - C 19 PERIODS

Module 5 INTRODUCTION TO WIRELESS, CELLULAR, DIGITAL & MOBILE 7

5.1 Mobile Communication: Evolution and Fundamentals.
5.2 International Mobile Satellite, Low orbit and medium altitude, Earth orbit, Satellite frequency band.
5.3 Personnel communication systems.
5.4 Standards – the importance of national and international standardisation.
5.5 Mobile personal computer (PC) and personal communication systems.

Module 6 SPREAD SPECTRUM SYSTEM 7

6.1 Introduction.
6.2 Fundamental concepts.
6.3 Code division multiple access (CDMA), direct sequence and frequency hopped spread – spectrum system.
6.4 Frequency hopping spread – spectrum system.
6.5 Synchronisation of spread – spectrum system.
6.6 Spread – spectrum application in cellular, PC and mobile.

Module 7 CELLULAR AND WIRELESS SYSTEM ENGINEERING 5

7.1 Introduction.
7.2 Time division multiple access wireless cellular system.
7.3 Code division multiple access (CDMA) spread spectrum digital cellular system.

PC MAINTENANCE & NETWORKING LAB

Subject Code	Course offered in	Course Duration	5 sessional contact periods	Full Marks
IT / 6 / S1 / PMNL	Part – III Second Semester	17 weeks	per week	100

CONTACT PERIODS	INTERNAL ASSESSMENT	TOTAL
75 @ 5 sessional contact periods per week for 15 weeks	10 periods	85 periods

EXAMINATION SCHEME

1. **Continues internal assessment of 50 mark**s is to be carried out by teachers throughout Part – III Second Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External assessment of 50 mark**s shall be held at the end of Part – III Second Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot Job-25, Viva-voce - 25

DETAIL COURSE CONTENT

Job 1 To locate and identify the most common components (parts) in a modern PC (PC, PC-AT to Pentium).

Job 2 To install and configure FDD and HDD.

Job 3 To be familiar with and to be able to troubleshoot motherboard.

Job 4 To be familiar with SMPS.

Job 5 To install video card, sound card, etc.

Job 6 To install DMP, inkjet and laser printing; to undertake preventive maintenance and to troubleshoot DMP.

Job 7 To disassemble and reassemble a total PC system.

Job 8 To practice anti-virus software installation and virus removal.

Job 9 To install Windows 95/98/NT, UNIX, Linux.

Job 10 To be familiar with different network cables (UTP, STP, Coaxial), Connectors (BNC, BNC-T, RJ-11 (4 wire) RJ-45 (8 wire), DB9, DB15) and Terminator.

Job 11 To study crimping: RJ-45, RJ-11, Cross-over Cable.

Job 12 To study the different expansion slots of a motherboard, set the NIC to expansion slot and to install the driver.

Job 13 To connect HUB with other nodes and HUB-to-HUB.

Job 14 To make a peer-to-peer Network System.

Job 15 To run the following application in a network system and get knowledge**:** (i) FTP, (ii) Telnet, (iii) Mail, and, (iv) Talk.

Job 16 To use the ping utility in order to understand its use in a trouble shooting environment.

Job 17 To be familiar with loop back testing.

Job 18 To be familiar with the idea of socket and to write a socket program.

REFERENCE BOOKS

1. Hands on networking essentials with projects / M.J. Palmer
2. Internet working with TCP-IP / D.E. Comer and D. Stevens / Prentice Hall of India
3. CISCO Internet working / Charles Riley / SPD Pvt. Ltd.
4. Networking Cabling handbook / Chris Clark / Tata McGraw Hill
5. Designing and implementing local and WANs / M.J. Palmer and R.B. Sinclair / Vikas Publishing House.

WEB TECHNOLOGY LAB

Subject Code	Course offered in	Course Duration	5 sessional contact periods	Full Marks
IT / 6 / S2 / WTL	Part – III Second Semester	17 weeks	per week	100

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPICS	CONTACT PERIODS
1	INTERNET BASICS	10
2	WEB SERVER	5
3	INTERNET SERVICES	5
4	HTML / Applet	20
5	ACTIVE SERVER PAGES	35

CONTACT PERIODS: 75 INTERNAL ASSESSMENT: 10 TOTAL PERIODS: 85

EXAMINATION SCHEME

1. **Continues internal assessment of 50 mark**s is to be carried out by teachers throughout Part – III Second Semester. **Distribution of marks:** Performance of Job – 35, Notebook – 15.
2. **External assessment of 50 mark**s shall be held at the end of Part – III Second Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot Job-25, Viva-voce – 25.

DETAIL COURSE CONTENT

Module 1 INTERNET BASICS 10 PERIODS

5.1 Familiarity with internet browser(MS-Explorer, Netscape)

5.2 Working with browser window tool bar , menu bar

5.3 Browsing a given web site address, Searching a particular topic

5.4 through search engines.

5.5 Familiarity with E-Mail, sending viewing printing e-mail message.

5.6 Use of mailbox (inbox, outbox) in outlook express. Use of attachment facility available in e -mailing.

Module 2 WEB SERVER 5 PERIODS

Familiarity with web server – IIS, PWS etc. – Configuring web server – Creating virtual directory.

Module 3 INTERNET SERVICES 5 PERIODS

Concept and familiarity of various internet services (www, http, ftp, chat etc).

Module 4 HTML / APPLET 20 PERIODS

5.1 Creating simple HTML file, place it in web server and access it from client Browser.

5.2 Creating a HTML form incorporating GUI components (Command button, text box, radio button, check box, combo box etc).

5.3 Creating a simple applet and embedding it in HTML file.

5.4 Writing applet to in corporate GUI components (Command button, text box, radio button, check box, combo box etc).

5.5 Writing applet to incorporate events.

Module 5 ACTIVE SERVER PAGES 45 PERIODS

5.1 Introduction to Active Server Pages.

5.2 Elements of ASP (Scripts, Objects, Components).

5.3 Making your first Active Server Page.

5.4 INTRODUCING VB SCRIPT: Variables, Mathematical operators, functions — Logical operators, Loop, Conditional statements — String Function , Date and Time Function , Subroutine — Formatting Display, Adding Components to scripts — Handling Event driven programming

5.5 WORKING WITH ASP: Using HTTP — Writing simple ASP files — Controlling Execution of server side scripts — Problems on HTML forms to get user information and retrieving HTML form contents — Working with query string.

5.6 ASP SESSION: Introduction to session — Familiarity and working with session objects (simple problems) — Using session events — Familiarity and working with cookies.

5.7 ASP APPLICATION: Introduction to ASP Application features of ASP Application — Creating a Simple ASP Application, Setting the properties of ASP Application — Using Application objects and Application events.

5.8 ASP COMPONENTS: Using Components in ASP (Simple problems) — Creating Components with page scope, session scope, Application scope — Working with browser capability component, file assess components , counter components etc.(Simple problems)

5.9 DATABASE MANAGEMENT THROUGH ASP: Brief overview of ActiveX Data Objects — Using ADO to access a database from ASP (Simple Problem) — Opening, closing database connection — Executing SQL statements.

COMPUTER GRAPHICS

(ONE OF THE COURSES OFFERED AS ELECTIVE)

OBJECTIVE

Students through this course will enhance their knowledge in mathematical models of programming languages, computers and capability of a computer.

COMPUTER GRAPHICS

Subject Code	Course offered in	Course Duration	3 lecture contact periods	Full Marks
IT / 6 / T5 / CGR	Part – III Second Semester	17 weeks	per week	75

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	CO-ORDINATE SYSTEM	6
	2	STRAIGHT LINES	7
	3	PLANES	7
B	4	INTRODUCTION TO GRAPHIC PRESENTATION OF PICTURE	2
	5	OVERVIEW OF GRAPHICS SYSTEM	4
	6	OUTPUT PRIMITIVES	7
	7	GEOMETRIC TRANSFORMATIONS	3
	8	VIEWING	4
	9	COMPUTER ANIMATION	5

CONTACT PERIODS: 45 **INTERNAL ASSESMENT: 6** **TOTAL PERIODS: 51**

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2, 3	11	ANY 25	ONE	1 x 25 = 25	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	4, 5, 6, 7, 8, 9	22				FIVE			

DETAIL COURSE CONTENT

GROUP – A 20 PERIODS

Module 1 CO-ORDINATE SYSTEM 6

Origin – Axes and co-ordinate planes – Co-ordinates of a point – Change of origin – Distance of a point from the origin- Distance between two points – Direction cosine of a line – Angle between two co-planar lines – Direction cosine of a line joining two points.

Module 2 STRAIGHT LINE 7

Equation of a straight line in symmetrical form – Normal form - Straight line passing through two given points – Intersection of a straight line & a plane – Condition of co-planarity of two straight line – Distance of a point from a straight line – Skew line – Shortest distance between two skew lines – Image.

Module 3 PLANE 7

Equation of a plane - Equation of planes in different form: Normal, Intercept form - Planes passing through three Given points –Angle between two planes – Distance of a point from a plane – Two intersecting planes – Intersection of a straight line and a plane –Plane through given straight line.

GROUP – B 25 PERIODS

Module 4 INTRODUCTION TO GRAPHIC PRESENTATION OF PICTURE 2

Definition of Computer Graphics – Different Steps to Present a Picture – Picture Files – Display Files – Pixel.

Module 5 OVERVIEW OF GRAPHICS SYSTEM 4

Cathode Ray Tubes - Raster Scan Displays - Random Scan Displays - Flat Panel Displays.

Module 6 OUTPUT PRIMITIVES 7

Points & lines – Line drawing algorithm – Brasenham's line drawing algorithm – Circle generating algorithm – Properties of circle – Midpoint circle algorithm – Ellipse generating algorithm – Properties of Ellipse – Mid point ellipse algorithm.

Module 7 GEOMETRIC TRANSFORMATIONS 4

Basic Transformations – Translation – Rotation – Scaling – Homogeneous Co-ordinates – Other Transformations – Reflections in Different Lines, Axis & Points – Shear.

Module 8 VIEWING 3

Projections – Parallel Projections – Perspective Projections – Windowing – Clipping - Normalized View Volume – View Port Clipping.

Module 9 COMPUTER ANIMATIONS 5

Design of animation sequence – General Computer Animation Function – Raster Animation – Computer Animation Language – Key Frame System – Morphing.

COMPUTER GRAPHICS LAB

Subject Code	Course offered in	Course Duration	Full Marks
IT / 6 / S5 / LCGR	Part – III Second Semester	17 weeks	50

CONTACT PERIODS	INTERNAL ASSESSMENT	TOTAL
60 @ 4 sessional contact periods per week for 15 weeks	10 periods	85 periods

EXAMINATION SCHEME

1. **Continues internal assessment of 25 mark**s is to be carried out by teachers throughout Part – III Second Semester. **Distribution of marks:** Performance of Job – 15, Notebook – 10.
2. **External assessment of 25 mark**s shall be held at the end of Part – III Second Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot Job – 12.5, Viva-voce – 12.5

DETAIL COURSE CONTENT

Job 1 To practice point plotting, line and regular figure algorithms.

Job 2 Raster scan line and circle drawing algorithm.

Job 3 To practice clipping and windowing algorithms for points, lines and polygons.

Job 4 To practice 2-D / 3-D transformations.

Job 5 Simple fractal representation.

Job 6 To practice filling algorithms.

Job 7 To create animation using Flash.

REFERENCE BOOKS

1. Computer Graphics / Hearn & Baker
2. Computer Graphics / Harrington
3. Computer Graphics / Rankin

MULTIMEDIA TECHNOLOGY

(ONE OF THE COURSES OFFERED AS ELECTIVE)

MULTIMEDIA TECHNOLOGY

Subject Code	Course offered in	Course Duration	3 lecture contact periods	Full Marks
IT / 6 / T6 / MMT	Part – III Second Semester	17 weeks	per week	75

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	OVERVIEW OF MULTIMEDIA	9
	2	INTRODUCTION TO SOUND & AUDIO	12
B	3	INTRODUCTION TO IMAGE AND GRAPHICS	12
	4	MOTION VIDEO TECHNOLOGY	12

CONTACT PERIODS: 45 INTERNAL ASSESMENT: 6 TOTAL PERIODS: 51

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2	16	ANY 25	ONE	1 x 25 = 25	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	3, 4	18				FIVE			

DETAIL COURSE CONTENT

GROUP – A 21 PERIODS

Module 1 OVERVIEW OF MULTIMEDIA 9

1.1 Introduction to multimedia.
1.2 Need for multimedia.
1.3 Present market and future potential.
1.4 Dimension of multimedia.
1.5 Multimedia product possibilities.
1.6 Multimedia concepts.
1.7 Multimedia in education.
1.8 Multimedia hardware and software products.

Module 2 INTRODUCTION TO SOUND & AUDIO 12

2.1 Basics of Acoustics, Psyschacoustics.
2.2 Musical sound and noise, elementary sound system.
2.3 Microphones, Amplifiers, Digital representation – PCM, ADC, DAC sound, audio, compression, digital audio formats

GROUP – B 24 PERIODS

Module 3 INTRODUCTION TO IMAGE AND GRAPHICS 12

3.1 Introduction to Image.
3.2 Perception of human eye.
3.3 Vector and raster graphics.
3.4 Digital representation of image, colour, 16-bit, 24 bit colour depth.
3.5 Basic colour theory.
3.6 Colour characteristic – Hue, Saturation, Limiance.
3.7 Colour palette.
3.8 Monitor and Print Display.
3.9 Basic Image Processing Criteria.
3.10 Image Compression – JPEG, MPEG, BMP, GIFF, lossy and non-lossy.
3.11 Image evaluation, layers, filters.

3.12 Image manipulation – scaling, cropping, rotation.
3.13 Colour printer basics.
3.14 Image capture-scanning basics.
3.15 Digital still camera.

Module 4 MOTION VIDEO TECHNOLOGY 12

4.1 Introduction to video.
4.2 Video in multimedia.
4.3 Basics of motion-video.
4.4 Sources of motion-video.
4.5 Video formats, lines, frames, fields.
4.6 Synchronisation aspect ratio, etc.
4.7 TV broadcast standards – PAL, NTSE, SECAM.
4.8 Horizontal, vertical resolution.
4.9 Analog video camera principle – monochrome, colour video concepts.
4.10 Types of camera – Luma, Chroma.
4.11 Component and composite video.
4.12 Digitisation basics.
4.13 Spatial resolution and bandwidth.
4.14 Sampling and nyquist theorem.
4.15 Sampling RGB, composites.
4.16 Magnitude domain discretisation.
4.17 Colour bitmap encoding.
4.18 Video compression – Lossless and lossy.

MULTIMEDIA TECHNOLOGY LAB

Subject Code	Course offered in	Course Duration	4 sessional contact periods	Full Marks
IT / 6 / S7 / LOR	Part – III Second Semester	17 weeks	per week	50

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPICS	CONTACT PERIODS
1	SOUND FORGE	15
2	ADOBE PREMIERE	15
3	ADOBE PHOTOSHOP	15
4	AUTHORWARE	15

CONTACT PERIODS: 60 INTERNAL ASSESSMENT: 8 TOTAL PERIODS: 68

EXAMINATION SCHEME

1. **Continues internal assessment of 25 mark**s is to be carried out by teachers throughout Part – III Second Semester. **Distribution of marks:** Performance of Job – 15, Notebook – 10.
2. **External assessment of 25 mark**s shall be held at the end of Part – III Second Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot Job – 12.5, Viva-voce – 12.5

DETAIL COURSE CONTENT

Module 1 SOUND FORGE 15

Sound recording and editing through sound forge XP

1.1 The main screen, data window.
1.2 Opening an existing file-playing a sound file.
1.3 Playing a section of a file.
1.4 Coping data to new file and saving a file.
1.5 Simple Editing.
1.6 Advanced Editing.
1.7 Editing Sound Formats.
1.8 Applying sound processing functions.

1.9 Recording sound using sound forge.

Module 2 ADOBE PREMIERE 15

2.1 Creating desktop video with Adobe Premiere.

2.2 Creating an Adobe Premier Movie.

2.3 Starting a new projects importing clips, assembling the clipping construction window, previewing the movie, changing duration of a cell creating a transition, adding other clips and transition.

2.4 Applying filters to a clips.

2.5 Changing the time unit in the construction window.

2.6 Using preview command to preview the transition and filter effect.

2.7 Adding sound to movie.

2.8 Connecting and capturing source video through broadway cord.

2.9 Editing and compressing the video.

Module 3 ADOBE PHOTOSHOP 15

3.1 Scanning image.

3.2 Creating new images.

3.3 Changing background and foreground colours.

3.4 Creating and using paths.

3.5 Editing and retouching.

3.6 Duplicating images.

3.7 Layers – linking with layers.

3.8 Grouping images.

3.9 Rubber stamp and pattern stamp tool.

3.10 Painting – Paintbrush tool, pencil tool, eraser tool, gradient tool.

Module 4 AUTHORWARE 15

4.1 Introduction, general features, installation.

4.2 Knowledge object, introduction to knowledge object.

4.3 Choosing, adding knowledge object.

4.4 Authorware knowledge object.

4.5 Authoring basics – icon based authoring.

4.6 Creating interactions – components of interaction, setting up interaction, tracing the flow of interaction.

4.7 Directing the flow – decision structure, frameworks, navigation structure.

4.8 Transitions, positioning and motion – using transition for special effects.

4.9 Positioning object using motion icon, making objects movie.

REFERENCE BOOKS

1. Multimedia: Production, Planning and Delivery by John Villamil-Casanova and Louis Molina, PHI
2. Multimedia: Sound and Video by Jose Lozano, PHI
3. Multimedia Graphics by Leony Fernandez – Elias and John Villamil-Casanova, PHI
4. Multimedia on the Web by Stephen McGloughlin, PHI

OPERATION RESEARCH

(ONE OF THE COURSES OFFERED AS ELECTIVE)

OPERATION RESEARCH

Subject Code	Course offered in	Course Duration	3 lecture contact periods	Full Marks
CST / 5 / T5 / OR	Part – III Second Semester	17 weeks	per week	75

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	INTRODUCTION	2
	2	LINEAR PROGRAMMING	25
B	3	TRANSPORTATION PROBLEM	5
	4	ASSIGNMENT PROBLEM	3
	5	PROJECT MANAGEMENT	10

CONTACT PERIODS: 45 INTERNAL ASSESMENT: 6 TOTAL PERIODS: 51

EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1, 2	20	ANY 25	ONE	1 x 25 = 25	FIVE	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	3, 4, 5	14				FOUR			

DETAIL COURSE CONTENT

GROUP – A 27 PERIODS

Module 5 INTRODUCTION 2

Origin and Development of O R - Meaning of O R, Scope of O R, Characteristics of O R, Uses and limitation of O R.

Module 6 LINEAR PROGRAMMING 25

2.1. Introduction, Formulation of the L.P.P., Graphical solution method (only introduction), Canonical & Standard form of L.P.P.

2.2. Linear Programming Method: Basic solution, Degenerate solution, Basic Feasible solution, Associated Cost vector, Improved Basic Feasible solution, Optimum Basic Feasible solution. (Definitions only) — Simplex method, Artificial Variable technique up to optimality, (Big M method).

2.3. Duality in Linear Programming: Concept of duality, Primal problem, Dual problem (Definitions only), Writing Dual problem from Primal problem and vice versa.

2.4. Dual Simplex Method

2.5. Revised Simplex Method: Introduction, standard form of Revised Simplex method, computational procedure, Revised Simplex method vs. Simplex method.

GROUP – B 18 PERIODS

Module 7 TRANSPORTATION PROBLEM 5

3.1. Mathematical formulation, Initial basic feasible solution (North–West corner rule), row minima, column minima, matrix minima method, Vogel's Approximation method (VAM).

3.2. Optimality test (U-V method), Unbalanced T.P (Definition only).

Module 8 ASSIGNMENT PROBLEM 3

Mathematical formulation; Optimality test; Unbalanced A.P. (Definition only)

Module 9 PROJECT MANAGEMENT 10

Introduction to network analysis – Definitions of project, job, events, networks – Construction of the arrow diagram (network) – **C**ritical **P**ath **M**ethod: Determination of critical paths & calculation of floats – **P**roject

Evaluation & **R**eview **T**echnique – Resource Allocation Technique: Project scheduling with constraints resources.

OPERATIONS RESEARCH LAB

Subject Code	Course offered in	Course Duration	Full Marks
CST / 6 / S7 / LOR	Part – III Second Semester	17 weeks	50

CONTACT PERIODS	INTERNAL ASSESSMENT	TOTAL
60 @ 4 sessional contact periods per week for 15 weeks	8 periods	68 periods

EXAMINATION SCHEME

3. **Continues internal assessment of 25 mark**s is to be carried out by teachers throughout Part – III Second Semester. **Distribution of marks:** Performance of Job – 15, Notebook – 10.
4. **External assessment of 25 mark**s shall be held at the end of Part – III Second Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks:** On spot Job – 12.5, Viva-voce – 12.5

DETAIL COURSE CONTENT

Programming of the following problems using C or FORTRAN language:—

1. Linear Programming: Simplex method, Transportation problem, Assignment problem.
2. Shortest Path problem.
3. PERT / CPM problems.

REFERENCE BOOKS

1. Operation Research / Kanti Swarup & P.K. Gupta / S. Chand
2. Operation Research / R. Paneerselvan / PHI
3. Operation Research, An Introduction / Hamoya Saha / PHI
4. Operation Research / P.K. Gupta & D.S. Hira
5. Operation Research / Mustafi
6. Theory & Problems on Quantitative Techniques. Management Information System & Data Processing / S.K. Chakraborty

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IT PROJECT WORK & SEMINAR ON IT PROJECT WORK

Courses offered in Part – III

OBJECTIVE

Project Work is intended to provide opportunity for students to develop understanding of the interrelationship between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills. The basic objective of a project class would be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, aging, it should provide a taste of real life problem that a diploma-holder may encounter as a professional. It will be appreciated if the polytechnics develop interaction with local industry and local developmental agencies viz. different *Panchayet* bodies, the municipalities etc. for choosing topics of projects and / or for case study. The course further includes preparation of a Project Report which, among other things, consists of technical description of the project. The Report should be submitted in two copies, one to be retained in the library of the institute. The Report needs to be prepared in computer using Word and CADD software wherever necessary.

Seminar on Project Work is intended to provide opportunity for students to present the Project Work in front of a technical gathering with the help of different oral, aural and visual communication aids which they learnt through different courses in the Parts – I & II of the diploma course. In the Seminar, students are not only expected to present their Project Work, but also to defend the same while answering questions arising out of their presentation.

GENERAL GUIDELINE

Project Work is conceived as a group work through which the spirit of team building is expected to be developed. Students will be required to carry out their Project Works in groups under supervision of a lecturer of their core discipline who will work as a Project Guide. It is expected that most of the lecturers of the core discipline will act as project guide and each should supervise the work of at least two groups. Number of students per group will vary with the number of lecturers acting as Project Guide and student strength of that particular class.

In the **Part – III First Semester** four sessional periods will be utilised for performing **Project Work**. In the **Part – III Second Semester**, for the first twelve & half weeks the five sessional periods allocated to 'Project Work' along with the single sessional period allocated to 'Seminar on Project Work' will be together utilised for **Project work**; whereas in the last two & half weeks of the Part – III Second Semester all these six sessional periods allocated to 'Project Work' and 'Seminar on Project Work' will be utilised for performing **Seminar**. In 'Seminar' classes all the teachers who are involved with imparting knowledge and skill to the students in their "Project" classes should be present along with all the students.

The students are expected to incorporate any positive suggestion that they receive, and, to correct any mistake that are pointed out during the Seminar before the External Assessment of the Project Work, which shall take place at the end of the Part – III Second Semester.

COURSE & EXAMINATION SCHEDULE

SUBJECT CODE	NAME OF THE COURSES	COURSES OFFERED IN	COURSE DURATION	CONTACT PERIODS	MARKS ALLOTTED
IT / 5 & 6 / S3 / ITPW	IT Project Work (Group – A)	Part – III First Semester	15 Weeks	60 contact periods @ 4 sessional contact periods per week	**Continuous Internal Assessment of 100 marks** is to be carried out by the teachers throughout the two semesters where marks allotted for assessment of sessional work undertaken in each semester is 50. **Distribution of marks:** Project Work – 50, Project Report – 25, Viva-voce – 25**.** **External assessment of 100 marks** shall be held at the end of the Part – III Second Semester on the entire syllabi of IT Project Work. The external examiner is to be from Industry / Engineering College / University / Government Organisation. **Distribution of marks:** Project Work - 25, Project Report – 25, Viva-voce – 50**.**
	IT Project Work (Group – B)	Part – III Second Semester	First 12½ Weeks	75 contact periods @ 6 sessional contact periods per week	
IT / 6 / S4 / SMNR	Seminar on IT Project Work	Part – III Second Semester	Last 2½ Weeks	15 contact periods @ 6 sessional contact periods per week	**Continuous Internal Assessment of 25 marks** for a particular group is to be awarded by their concerned Project Guide. **External Assessment of 25 marks** is to be awarded by all the other Project Guides present in the Seminar.

THE PROJECT

Each group will take *at least one project* in the entire session. The following subject areas may be selected for project work. The selected topic, however, need not be limited to those areas only:—

(a) Database Management System,
(b) Operation Research,
(c) Microprocessor interfacing,
(d) Object Oriented Programming,
(e) Graphics Users Interface,
(f) Computer Graphics,
(g) Multimedia Technology,
(h) Web based application, and,
(i) a particular project may be part of a bigger project depending upon the complexity.

The Project Report must include the following sections:—

1. Introduction – Problem definition – Scope and Objective of the problem,
2. System Environment,
3. System Analysis and Requirement Analysis,
4. System Design and Implementation,
5. System Testing, and,

6. Conclusion.

Note: *Project Work relevant to Sections 1, 2, 3 should be completed and those related to Section 4 should be initiated within the Part – III First Semester and be internally assessed in the same semester. The rest of the Project Work is to be completed and assessed internally within first twelve & half weeks of Part – III Second Semester.*

GENERAL VIVA–VOCE

Subject Code	Course offered in	Full Marks
IT / 6 / S8 / GVV	Part – III Second Semester	100

COURSE CONTENT

The syllabi of all the theoretical and sessional subjects taught in the three years of diploma education.

EXAMINATION SCHEME

The Final Viva-Voce Examination shall take place at the end of the Part – III Second Semester. It is to be taken by one External and one Internal Examiner. The **External Examiner** is to be from industry / engineering college / university / government organisation and he / she should give credit out of **50 marks;** whereas, the **Internal Examiner** should normally be the Head of the Department and he / she should give credit of **50 marks.** In the absence of the Head of the Department, the senior most lecturer will act as the Internal Examiner.
