MOHANLAL SUKHADIA UNIVERSITY: UDAIPUR

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

(A Choice Based Credit System Effective from 2010-11)

1. Duration of the Course

The Master of Information Technology M.Sc. (IT) shall be of four semesters duration which will be conducted in two years. Each semester will be approximately 5 months (minimum 90 working days in a semester) duration.

2. Eligibility:

Candidates seeking admission to the first semester of Master of Information Technology must have a B.Sc. or equivalent/B.C.A degree (10+2+3 scheme) or Graduation followed by PGDCA or equivalent with minimum 50% marks from a recognized university.

3. Admissions:

Admissions to the first year of M.Sc.(IT) shall be made on the basis of an entrance test conducted by the university.

4. Medium of Instruction

The medium of instruction and examination shall be english.

5. No. of Seats

Total 25 seats (Self –Finance seats). Or as decided by university

6. Curriculam

6.1 M.Sc (IT) Programme has a two year , four semester prescribed course structure which in general terms is known as curriculum. It prescribes courses to be studied in each semester as given under courses of study and examination

6.2 M.Sc. programme shall have a curriculum and course contents (syllabi) for the courses recommended by the committee courses in Informatics and Computational Sciences and approved by the academic council of the university.

6.3 The programme shall follow a credit based semester system. Each academic year is divided in to two semesters as prescribed in 6.1

6.4 Course Credit System/Structure

In general a certain quantum of work measured in terms of credits is laid down as the requirement for a particular degree. A student earns the credits for a particular course by fulfilling the academic requirements viz. attendance and evaluation. The total credits required for completing the M.Sc.(IT) program shall be 108. The total number of credits in each semester (I to III semester) shall be 30 and 18 in the IV semester. Number of credits for a course in any semester is calculated as follows.

Sr.No	Course	Credits
1	One Lecture or tutorial hr/week	1
2	Two Laboratory hours/week	1
3	Seminar 4hrs/week	2
4	Full semester project	18

Credits are awarded to a student for Theory / Laboratory / Other Courses only if the student satisfies the minimum attendance requirement and the evaluation requirements.

6.5 Seminars

Seminar is a course requirement wherein under the guidance of an internal guide a student is expected to do in depth study of topics allotted to them by doing literature survey, and understanding different aspects of the technology. It is mandatory to give a seminar presentation before a panel constituted for the purpose. 4hrs/week is allotted for seminars, which will be used for seminars by students as well as extension lectures/ seminar by faculty members as well as subject experts from other institutions. Participation in the seminars by the students shall be compulsory. The credits shall be awarded on the basis of the following:

(a) Understanding of the concept and presentation by the student concerned.(50%)
(b) Literature survey & detailed report (25%)
(c) Active participation & attendance in the seminars (25%)

6.6 Project Work

Project work will be offered in the fourth semester which shall be typically carried out in the industrial/ Research organization individually by the candidates admitted in the sixth semester. A faculty member will be appointed to guide the students and shall be called the internal guide and the scientist / manager guiding the student (at site) shall be called as external guide. It is mandatory to submit the progress report at every 30 days to the internal guide through the external guide giving number of hours the candidate has worked for the project. During the project period, a student is expected to work at least 36 hrs/week. Thus a candidate who successfully completes the project work can earn 18 credit points. At the end of semester-IV , the student has to submit a formal individual project report in a prescribed format. He is required to submit a certificate of successful completion of the project from his external guide giving

total number of hours the candidates has worked toward the project and his conduct during the project work. Evaluation of the project will be carried out by a committee consisting of external examiner and internal examiner by examining the project report, presentation of the project and demonstration of the working model of the project with sufficient data to check the working of the project.

6.7. Earning credits:

At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average. Some of the subjects in a course may be marked as audit course. Grades obtained in the audit courses are not counted for computation of grade point average. However, a pass grade is essential for earning credits from an audit course. A minimum number of earned credits are required in order to qualify for a degree and continuation of registration at any stage.

The credit system enables continuous evaluation of a student's performance, and allows the students to progress at an optimum pace suited to individual ability and convenience, subject to fulfilling minimum requirement for continuation.

7 REGISTRATION:

7.1 Faculty Advisor

A student or a group of students is assigned to a faculty advisor from the concerned department, who will mentor the student throughout his/her tenure in the Institute. The students are expected to consult the faculty advisor on any matter relating to their academic performance and the courses they may take in various semesters / summer terms. The faculty advisor is assigned to extend guidance to the students enabling them to complete their courses of study for the required degree in a smooth and timely manner. Thus, the role of the faculty

advisor is of immense importance. The faculty advisor is the person to whom the parents/guardians should contact for performance related issues of their ward. In view of the guidance to the students the role of faculty advisor is outlined as below

(a) Guidance about the rules and regulations of the courses of study for the programme
(b) Pay special attention to weak students.
(c) Guidance and liaison with parents of students for their Performances and other personal problems a student may have.

7.2 Each student shall be required to register for course work on the advice of the Faculty Advisor at commencement of each semester on the day fixed for such registration and notified by the examination section of the university. Registration involved filling up a registration form by stating the theory course / Laboratory / Seminar / Project, etc.

7.3 Each student shall also register for the audit course/ elective courses in consultation and approval of Faculty Advisor.

7.4 Only those student will be permitted to register course work who have cleared all dues of the previous year / semester of the department and Hostel.

7.6 Such students who have earned at least 40 credits out of the total 60 credits in the I &II semester will be allowed to register for the next year. The credit, if any, earned from the audit pass course shall not be counted towards the minimum requirement of the credit. The students admitted second year , but have backlog papers, have to earn the credits for backlog courses on self-study basis. They can appear in the End Semester Examination (ESE) for backlog courses. However if the student appears for end semester examination of backlog course code, the performance of that examination will be considered and

his/ her previous performance of End Semester Examination shall be treated as cancelled. The marks obtained by the candidate for Continuous Assessment (CA) shall be carry forwarded and shall be added to ESE marks from backlog papers.

7.7 Such students who have failed to earn minimum 40 credits out of 60 credits in the academic year will not be allowed to register for next higher class. Such students will have to register for the backlog course codes in the respective next semester, undergo class room/Laboratory instructions and appear for CA and ESE. Such student will have to pay tuition fees per course code as decided by the university from time to time.

7.11 **Course Coordinator**: For each course, Head of the department/Course Director may appoint a course coordinator to assist him in managing the course.

8 ATTENDANCE:

Regular attendance of the student is an important factor in grading system. No grade can be given to a student unless he/she has attended the course regularly.

8.1 Regular 100% attendance is expected of all students for every registered course in theory, laboratory and seminar. Hence attendance is compulsory and will be monitored in the semester and students will be informed at the end of the month and end of semester.

8.2 A maximum of 25% absence for the attendance may be condoned only on valid grounds such as illness, death in family or other emergency beyond students control and approved by the Head of the Department / Course Director. Sanctions to be taken within a week after joining if on medical grounds.

8.3 For Students participating in Sports / Cultural event/NCC camps during a semester the maximum number of days of absence shall not exceed 8 days. Any waiver in this context shall be on the recommendation of the Dean - Student Welfare and the student will be required to apply in advance for the leave to the Head/Course Director through Faculty Advisor/Course Co-ordinator. This however shall be within the 25% of absence as mentioned in 8.2

8.4 A student having attendance lower that 75% in a course is detained by the course instructor and debarred from appearing in the ESE for that course in that semester and the student will have to re-register for the course as and when it is offered. However, a course instructor may detain a candidate by awarding I grade for want of required attendance provided the candidate was regular while he was attending the course but the absence was due to medical or other special circumstances and the overall performance in the internal assessment has been very good (70% or more). Such candidates will be required apply to the Head of the department or course Director within three days from the declaration of I grade by the course instructor. The Head of the Department/course Director will constitute a committee and the student will be required to appear before the committee to explain his case. If the committee is convinced with the explanation and find that the candidate satisfied all the conditions for award of grade I, special classes /tutorials (Not exceeding 10% of the total classes held in the concerned paper) may be conducted before the end semester examination, provided sufficient time period is left before the end semester examination and the course instructor is available for the additional classes/tutorials. In such cases, the student will be required to deposit a fee decided by the committee mainly to meet out the expenses incurred to conduct the additional lectures/tutorials/practical. If the student fails to convert his I grade, the student shall have to re-register for the course as and when it is offered. In such cases the student is given X grade.

8.5 Leave of Absence

a. If the period of leave is for a short duration (less than a week), prior application for leave shall have to be submitted to the Head/Course Director stating fully the reasons for the leave requested for, along with the supporting document(s). Such leave shall be granted by the Head/Course Director

b. Absence for a period not exceeding one week in a semester due to sickness or any other unavoidable reasons for which prior application could not be made may be condoned by the Head of the Department provided he/she is satisfied with the explanation**.**

c. If the period of absence is likely to exceed one week, a prior application for grant of leave will have to be submitted to the Head /Course Director with supporting documents. In each
case the decision to grant leave shall be taken by a committee constituted by the Head/Course Director. The committee on receipt of an application may decide whether the student be asked to withdraw from the course for that particular semester because of his long absence.

8 TEMPORARY WITHDRAWAL FROM THE PROGRAMME

A student seeking temporary withdrawal is granted permission by the Vice-Chancellor to withdraw from the Programme for one semester/year for reasons of ill health or other valid reasons on the recommendations of concerned HOD/Course Director on the following terms:

8.1 The student applies to the Head/Course Director within six weeks of commencement of the term or from within six weeks of his / her last attendance

in class whichever is earlier, stating the reasons for such withdrawal with supporting documents and endorsement of his/her parents.

8.2 The fee deposited for the current semester shall not be refunded for the students who applies for withdrawal after two weeks of commencement of the terms.

8.3 Normally, a student shall be permitted to avail of temporary withdrawal only once during the Programme duration at the institute and for a maximum duration of two semesters.

8.4 Such student who has discontinued and re-joins again will be governed by rules and regulations, courses of study, syllabi and fee in force at the time of his re-joining the Department. The joining time shall be the normal commencement of the term.

9 MODES OF ASSESSMENT

The Academic Board will decide from time to time on the system of examinations in each course in each semester. The current practice of Assessment of Theory and Laboratory Courses is as follows

9.1 A student is evaluated for theory courses through Internal Assessment and End Semester External Examinations. The IA consists of two internal semester examinations (40% weightage), one conducted during mid semester and second exam conducted towards end of the semester and teacher evaluation (60% weightage) through home assignments, viva/quiz , regularity etc.

9.2 The relative weightage is 25% for IA and 75% for ESE. Minimum marks for passing is calculated by the sum of marks obtained IA and ESE

The IA marks will be awarded by the teacher concerned and will be presented to the following committee for necessary approval. The committee may call for the internal examination answer books, assignment details etc. if necessary

(a) Head of the Department/Course Director
(b) Course Co-ordinator
(c) Nominee of the Vice-Chancellor

The Internal marks awarded will be displayed on the notice board at least one week before the ESE. Grievances, if any, from the student shall be examined by the above committee. The student will be given an opportunity to represent his case to the committee in the presence of his faculty advisor.

9.3 The teacher shall announce the method of teacher evaluation at the beginning of the semester. All IA and ESE are compulsory for all students for award of credits in a course. The marking for all tests, tutorials and examinations will be on absolute basis. The final percentages of marks are calculated in each course as per the weightage indicated above.

9.4 No credits are awarded if the student remains absent in the Internal examinations and ESE or Continuous Assessment. If a candidate fails to attend in one of the two Internal examinations, in special cases and after satisfied by the reason for absence, department may conduct defaulters examination. The candidate will be required to pay prescribed fee for the defaulters examination to meet the expenditure towards conducting defaulters examination.

9.5 The laboratory course whether offered as an independent course or as an attached course with a theory course will have continuous assessment for award of Internal Assessment marks.

Most of the laboratory courses contains two parts as follows :

Part I : Assignments and Part II : Mini project based on implementation of concepts of laboratory course

Continuous Assessment of laboratory courses will be based on ,number of assignments/practical satisfactorily completed, punctuality, turn to turn supervision of student work, quality of work of journals, group discussions, overall understanding of the experiment and viva-voce examination (as per requirement of structure of course) .

Mini Project will be also assessed continuously by the concerned teacher and demonstration and presentation of workable mini project will be conducted at the end of the semester. This mini project can be developed by the group of maximum two students only. In such case the 70 % weightage will be given to completed assignments and 30% weightage will be given to the Mini Project otherwise overall evaluation shall consist of 100 % weightage to completed assignments .

9.6 The teacher shall announce the mode of evaluation and distribution of marks at the beginning of the laboratory course. It is obligatory to maintain and submit laboratory journal, prescribed documentation for the laboratory course, and reports.

9.7 The End-Semester Examination (ESE) shall generally be of three hours duration for each theory course and is held as per the schedule declared. The detail time-table for this is declared by the examination section of the university at least two weeks in advance of the conduction of ESE. The ESE for the laboratory course will be of 4 hrs duration.

9.8 All examinations and evaluations that are conducted are compulsory. Credits for a course will be awarded only if the student satisfies the minimum attendance

requirements and acquires the necessary minimum grades for that course. No credits are awarded if the student remains absent in internal examinations or ESE even though he/she has minimum attendance requirements.

9.9 Assessment of Project:

At the end of the sixth semester of study, a student will be examined in the course “Project”.

1. Project work must be performed individually.
2. Each Student shall be reporting with the progress in work to the internal guide as well as for guidance in project work.
3. The project Work should be of such a nature that it could prove useful or be relevant from the commercial/management/engineering / scientific angle.
4. The project report should be prepared in a format prescribed by the department which also specifies the contents and methods of presentation.
5. The project work carry 18 credits . The viva shall be conducted by the panel of minimum three examiners out which at least one examiner will be external examiner

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10. THE GRADING SYSTEM

10.1 Award of Grade

(a) The academic performance of a student is graded on a ten point scale . The letter grades, the guidelines for conversion of marks to letter grades and their equivalent grade points are as follows:

Sr. No	Grade	Grade points	Marks Range	Grade point Description of Performance
1	A+	10	91-100	Outstanding
2	A	9	81-90	Excellent
3	B+	8	71-80	Very Good
4	B	7	61-70	Good
5	C+	6	51-60	Average
6	C	5	41-50	Below Average
7	D	4	31-40	Marginal
8	E	2	21-30	Poor
9	F	0	0-20	Very Poor
10	I	0		Absent in the Exam but not detained (Incomplete)
	AP	0	40-100	Audit Pass
	AF	0	0-39	Audit Fail
	U	--		Unsatisfactory
	W	--		Withdrawal
	X	--		Continued
	S	--		Satisfactory Completion

	Z	--		Course Continuation

b.Description of the grades

A+ to D

The student shall pass the course if he/she gets any grade in the range “A+” to “D”.

E and F grades:

The E and F grades denote poor and very poor performance ie. failing a course. A student has to repeat all core courses in which he/she obtains either E or F grades until a passing grade is obtained. For the other (elective) courses in which E or F grades have been obtained the student may take the same course or any other courses from the same category. The E and F grades secured in any course stay permanently on the grade card. These grades are not counted in the calculation of the CGPA; however these are counted in the calculation of the SGPA.

I Grade

The I grade denotes incomplete performance in any courses. The student is temporarily assigned grade “I”, if he/she is not detained by an instructor but fails to appear for end-semester examination due to valid reason. Such a student will have to appear for the examination as and when conducted. An I grade also may be awarded by an instructor, if a candidates attendance is below 75% but above 60% and the absence is on medical grounds other special circumstances. The students should complete all requirements as per provisions within 10 days of commencement of End Semester Exams, the request to be made to the Head/Course Director.

(c) A student who has awarded grade E or F in a particular course is considered to be failed in that course and no credits will be awarded for the same the student will have to appear for the examination as and when it is conducted.

10.2 Grade "X"

(a) The grade "X" is assigned to the student if his/her attendance is less than 75% in the Lectures/Tutorial/Laboratory course and/or his/her performance in the semester is not satisfactory and/or he/she fails in the IA of the subject. A student with X grade will not be permitted to take the ESE in that subject. The student will be detained for that subject only and will have to re register for the subject as and when it is offered and appears as and when it is conducted. However if a student is detained in any of the course he/she, will not be admitted to the next year, unless he/she Re-registers for that course and obtained passing grade

(b) An'X' grade is treated as equivalent to F for purpose of CGPA calculation, and the following criteria in addition to poor attendance (less than 75% may be considered for the award of X grade : (1) Badly incomplete in semester record (due to non-medical reasons) {for example, in the case of a student who has missed all tests and assignments etc.) (2) Misconduct/use of unfair means in the examination, assignments etc., of a nature serious enough to invite disciplinary action in the opinion of the instructor. (It is emphasized that award of the X grade is in the nature of an immediate action in such cases, and the case may be referred to the Disciplinary Action Committee for consideration of further punishment depending on the seriousness of the offence). The names/roll numbers of students to be awarded the X grade should be communicated to the examination section in advance of the end-semester examination.

(C) Following rules apply for the course registered in any semester in which a student has acquired grade "X"

(i) He/she shall try to get a passing grade by registration for full examination in the next regular semester whenever it is offered. In this case the earlier performance of a student in all the evaluations will be treated as null and void.
(ii) A student registering for the course (Grade X) shall undergo all evaluations including IA and ESE and is eligible to acquire any grade between “A+” to “D” or “E /F ” .

10.3: Method of awarding grades:

(a)The ESE will be conducted by the examination section of the university. The question papers will be set by the examiners appointed by the university as per the syllabus, teaching plan and model question paper. University may conduct centre evaluation of the answer books by inviting external examiners or the answer books may be sent to the individual examiners for evaluation. After the evaluation of the answer books based on the IA and ESE marks, a semester board will award the grades.

(b) The semester board will consist following
- (i) Convenor of the Committee of Courses
- (ii) Head/Course Director
- (iii) Two subject experts
- (iv) Nominee of the Vice chancellor

In case semester board feels moderation/rec-checking of the answer book is necessary, recommendation with reason will be sent for the consideration of the Result committee of the University. The semester board will maintain strict confidentiality of the marks and results. The result will be declared by the Controller of Examinations.

(c)Evaluated answer papers of IA and ESE should be preserved at least for a minimum period of one semester.

11. Calculation SGPA and CGPA

11.1 Semester Grade Point Average (SGPA)

a) The performance of a student in a semester is indicated by the number called SGPA
b) The SGPA is the weighted average of the grade points obtained in al the courses registered by the student during the semester

c) If a numerical grade point equivalent to letter grade obtained by the student for the course with credit Ci then, SPGA for that semester calculated using the formula

SPGA $\frac{\sum Cigi}{\sum Ci}$

Where summation is for all the courses registered by a student in that semester. For example, if a student passes five courses in a semester with credits c1,c2,c3,c4,c5 and his grade points in these courses are g1, g2,g3,g4,g5 respectively, then SPGA is equal to

SPGA= $\frac{c1g1 + c2g2 + c3g3 + c4g4 + c5g5}{c1 + c2 + c3 + c4}$

The SPGA is calculated to two decimal places and rounded off.

d) For the students acquiring "I" grades in any of the courses, SPGA and CPGA calculated only after make-up examination.

e) Since the grades "I" are only temporary grades, they are not taken in the calculation of SPGA. The conversions of letter grades into SPGA and CPGA for the students acquiring "I" grade in any of the courses is suspended till declaration of the grades of make-up examination.

11.2 Cumulative Grade Point Average (CGPA)

(a) An up-to- date assessment of the overall performance of a student from the third semester onwards till completion of the programme is obtained by calculating a number called CGPA

(b) The CGPA is weighted average of the grade points obtained in all the courses registered by the student since the beginning of the third semester of the programme

$$\text{CGPA} = \frac{\sum Cigi}{\sum Ci}$$

Where summation is for all the courses registered by a student till that semester. The CGPA is also calculated at the end of every semester from third semester onwards to two decimal places and is rounded off.

(c) The CGPA shall reflect all courses done by the student including courses where he/she has failed.

(d) If a student is awarded with a passing grade for a course in which he/she was awarded previously "E" grade or "F" grade then CGPA is calculated by replacing corresponding Ci and gi in both numerator and denominator of the above formula. Thus a course is included only

once in CGPA calculation. The latest performance of a student in a course is considered for CGPA.

11.3. A candidate admitted to the MSC(IT) programme will be required to pass the course within five academic years from the year of admission to the first semester.

12. Courses of Study and Examination

Semester – I

Paper	Paper Name	L-T-P	No.of credits	Max. Marks		Total
				University Exam.	Internal Assessment	
1	2		3	4	5	6
Paper-I (MIT-101/MCA-101)	Introduction to Information Technology	3-1-0	4	75	25	100
Paper-II (MIT-102/MCA-202)	Computer Architecture	3-1-0	4	75	25	100
Paper-III (MIT-103/MCA-103)	Introduction to Programming	3-1-0	4	75	25	100
Paper-IV (MIT-104/MCA-201)	Data Structure	3-1-0	4	75	25	100
Paper-V (MIT-105/MCA-105)	Discrete Mathematics	3-1-0	4	75	25	100
Paper-VI (MIT-106)	Practical-I Computer Hardware Lab.	0-0-8	4	75	25	100
Paper-VII (MIT-107)	Practical-II Computer Programming Lab.-I	0-0-8	4	75	25	100
Paper-VIII (MIT-108)	Soft Skill Lab	1-0-2	2(AP)	25	25	50
Paper IX (MIT-109)	Seminar	4	2		50	50
	TOTAL		32(30)	550	225	750

Semester – II

1	2	3		4	5	6
Paper-I (MIT-201/MCA-301)	Database Systems	3-1-0	4	75	25	100
Paper-II (MIT-202/MCA-202)	Operating System	3-1-0	4	75	25	100
Paper-III (MIT-203/MCA-303)	Algorithms	3-0-2	4	75	25	100
Paper-IV (MCA-204/MCA-2)	Object Oriented Programming using C++	3-1-0	4	75	25	100
Paper-V (MIT-205/MCA-305)	Computer Networks	3-1-0	4	75	25	100
Paper-VI (MIT-206)	Practical-I: OOPS Lab	0-0-8	4	75	25	100
Paper-VII (MIT-207)	Practical-II: Operating Systems & Networking Lab.	0-0-8	4	75	25	100
Paper-VIII (MIT-208)	Practical-III: Visual Programming Lab	0-0-4	2(AP)		100	100
MCA-VIII (MIT-209)	Seminar	4	2		50	50
	TOTAL		32(30)	525	225	750

Semester – III

Paper	Paper Name	L-T-P	Credits	Max. Marks		Total
				University Exam.	Internal Assessment	
1	2	3	4	5	6	7
Paper-I (MIT-301/MCA 501)	Software Engineering	3-1-0	4	75	25	100
Paper-II (MIT-302/MCA 304)	Java Programming	3-1-0	4	75	25	100
Paper-III (MIT-303/MCA 403)	Network Management and Information Security	3-0-2	4	75	25	100
Paper-IV (MIT-304/MCA404)	Computer Graphics	3-1-0	4	75	25	100
Paper-V MIT-305A/MCA 551 MIT-305B/MCA541 MIT 305/MCA 553	Elective-1 (i) Embedded Systems (ii) Data Mining (iii) Image Processing	3-1-0	4	75	25	100

Paper-VI (MIT-306)	Practical-I: Graphics &Java Lab.	0-0-8	4	75	25	100
Paper-VII (MIT-307)	Practical-II: Elective Lab.	0-0-8	4	75	25	100
Paper-VIII (MIT-308)	Practical-III: Network Management	0-0-4	2(AP)		100	100
Paper-IXI (MIT-309)	Seminar	4	2		50	50
	TOTAL		32(30)	525	225	750

Semester – IV

Paper	Paper Name	No. credits	Max. Marks		Total
			University Exam.	Internal Assessment	
1	2	3	4	5	6
Paper-I (MIT-401)	Project Work	18	350	100	450
		18			

Total Credits: 168 Audit credits: 6

13.Examination rules

Examination Scheme:

a) University shall conduct examinations only after completion of at least 90 working days of instruction in each semester. External examination will be conducted on consecutive working days without any gap.

b) Each theory paper shall be of 100 marks (75 marks for written examination of 3-hrs duration and 25 marks for internal assessment

c) Each practical/Project paper shall be of 100 marks (75 marks for semester practical examination of six hours duration and 25 marks for internal assessment.

d) The question paper shall consist total six questions. Part-A shall consist of one compulsory question of 10 marks with ten parts covering the entire syllabus for which answer must be provided within 20 words for each. Part-B will consist five long answer questions (which requires answers in about 400 words for each), one from each unit with internal choice. Each question in the part-B will carry 13 marks each. Only one answer booklet

will be given to the students for answering all the questions. No supplementary answer books shall be allowed.

e). Detailed outline of the course and a list of textbooks and reference books and detailed lecture schedule will be intimated to the examiner along with a model paper to provide necessary guide lines to set question paper for the external examination.

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

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SYLLABUS

First Semester

Paper-I (MIT-101/MCA-101): Introduction to Information Technology

(Note : Only introductory concepts to be taught in the course.)

UNIT- I

Information Concepts and Processing: Definition, Need, Qualities, value of information. Categories of information in business organization, levels of information, data concepts, logical and physical concepts, data processing, Introduction to office automation.

Number systems: Binary numbers, octal numbers, hexadecimal numbers, Radix-decimal, octal, hexadecimal, conversion from one form to another-Examples, Representation of decimal, octal, hexadecimal numbers: fractional numbers and signed numbers, 1's and 2's complement forms, Binary arithmetic-addition, subtraction ,multiplication and division-Examples. Codes-Various types- ASCII and 8 bit EBCDIC

UNIT-II

An overview of a computer system: components of a computer system, various I/O and auxiliary storage devices

System software (Only Introductory level): Introduction to system software, Distinction between systems software and Application software. Introductory ideas of loaders and linkers

High level language (Only Introductory level): Different languages, introduction to Assemblers, Compilers and Interpreters, relative merits of compilers v/s interpreters

UNIT-III

Operating systems (Only introductory level): Evolution, introduction to OS , functions and facilities, single tasking and multitasking OS , single user and multi-user OS, characteristics of MS-DOS and Unix operating systems , DOS and UNIX commands for file and process management.

UNIT-IV

Text editors: overview of editing process

Graphical User Interfaces- Introduction to Windows, Word processing software packages and features, spread sheet packages and features

Database : Introduction to database and database packages.

Desktop Publishing: Introduction to desktop publishing and desk top publishing packages.

UNIT-V

Computer Communications (Only Introductory level) : Computer to computer communication through networking, Introduction to computer networks and networking software, Types of Networks, Internet and Intranet , Electronic mail.

Multimedia and Virtual reality: Introduction to Multimedia and Virtual reality

Specifications of a typical desktop computer system, Recent Developments in ICT

Recommended books:

1. Satish Jain , Information Technology
2. Alexis Leon , Fundamentals Of Information Technology
3. V.Rajaraman : Fundamentals of Computers

Paper-II (MIT-102/MCA-202):Computer Architecture

Unit I Processor Basics

Processor Basics: CPU Organization: Fundamentals, additional features. Data representation: Basic formats, fixed point numbers, floating-point numbers. Instuction sets: Instruction formats, instruction types, programming considerations.

Unit II Datapath Design

Datapath Design: Fixed point arithmetic: Addition and subtraction, multiplication, division. Arithmetic Logic Unit: Combinational ALUs, sequential ALUs. Advanced topics: Floating-point arithmetic, pipeline processing.

Unit III Control Design

Control Design: Basic concepts: Introduction, hardwired control, design examples. Micro-programmed control: Basic concepts, multiplier control unit, CPU control unit. Pipeline control: Instruction pipelines, pipeline performance, super-scalar processing.

Unit IV Memory Organization

Memory Organization: Memory technology: Memory device characteristics, random-access memories, serial-access memories. Memory systems: Multilevel memories, address translation, memory allocation. Caches: Main features, address mapping, structure versus performance.

Unit V System Organization

System Organization: IO and System Control: Programmed IO, DMA and interrupts, IO processors. Parallel processing: Processor-level parallelism, multiprocessors.

Text Books:J.P. Hayes: Computer Architecture and Organization, McGraw-Hill International editions.

Paper-III (MIT-103/MCA-103):Introduction to Programming

UNIT - I

Algorithm development: problem identification, algorithms, flow charts, testing and debugging, algorithms for searching (linear and binary), sorting (selection, bubble & insertion), merging of ordered list, analysis of algorithm.

UNIT – II

Programming in C: history, structure of C programs, compilation and execution of C programs, debugging techniques, character set, keywords, data type and variables, expressions, operators, operator precedence and their order of evaluation.

Control statements **-** if-else, switch, break, continue, coma operator, goto statement. Loops **-** for, while, do-while.

UNIT – III

Functions: built-in and user-defined functions function declaration, parameter passing-call by value & call by reference, recursive functions. storage classes - auto, extern, global and static.

Array: one dimensional and multi-dimensional array, array handling, passing arrays to functions, arrays and strings, string-handling functions.

UNIT – IV

Pointers: pointer variable and its importance, pointer arithmetic, array of pointers, function of pointers, structure of pointers, dynamic memory allocation functions, pointer to pointer.

Structures and Union : declaration of structures, pointer to structure, array of structure, pointer to function, self-referential structure, unions, enumeration, macro.

UNIT – V

File handling: opening and closing data file, creating a data file, read and write functions, formatted and unformatted data files, command line arguments.

Recommended books : How to solve it by computer - G. Dromey
Programming with C – Schaum's outline Series

Paper-IV (MIT-104/MCA-201):Data Structure

UNIT-I

Data Type - Data Object - Data Structure : Data abstraction and abstract data type; Notion of an algorithm - Complexity measures : Rate of growth, basic time analysis of an algorithm; ordering notion - detailed timing analysis - space complexity.

Arrays: Arrays and their representation-Single and multidimensional arrays-row major and column major ordering-address calculation.

Linked lists: Pointers and their uses- Continuous vs linked storage. Singly and doubly linked lists-Operations on lists-representation of Sparse matrices and polynomials using lists-Circular lists-generalized lists

UNIT-II

Storage management: Dynamic storage management-Reclamation and compaction-Boundary Tag method.

Stacks and Queues: Stacks and Queues-representation and Manipulation-Uses of stacks and Queues-Recursion, polish expressions

UNIT-III

Trees: Trees-Binary and N-ary trees-Representation of trees-Tree traversal algorithms-Threaded trees and advantages-Conversion of general trees to Binary trees-B trees-Applications: Decision trees, Game trees and expression parsing.

UNIT-IV

Graphs: Graphs and their representations**:** Matrix representation-List structure-Graph traversal algorithm, Application of graphs.

Strings and their features: Strings-Representation and Manipulation using Arrays and lists-String matching algorithms. Brute force, Knuth-Morris-Pratt and Boyer-Moore strategies.

UNIT-V

Sorting and Searching: Searching and sorting-Sequential, Binary and hashed Searching-Bubble sort, Insertion sort, shell sort, Merge sort and Quick sort-Comparison.

Tables: Decision tables-Symbol tables-Hash Tables-Examples of representation and implementation-Applications.

Reccomended Books :

1. Aho A.V. & Ullman J.E. : Data Structure & Algorithms
2. Aron M. Tannenbaum & Others : Data Structures using C
3. Mary E.S. Loomis : Data Management & File Structures
4. Bhagat Singh & Thomas Naps : Intrioduction to Data Structures
5. Trembley & Sorenson : An Introduction to Data Structures with Applications

Paper-V(MIT-105/MCA-105):Discrete Mathematics

UNIT-I

Set Theory: Introduction, sets and elements, universal set and empty set, subsets, venn diagram, set operations, algebra of sets and duality, finite sets, counting principle, classes of sets, power sets, partitions, mathematical induction.

Relations: Introduction, product set, relations, pictorial representation of relations, composition of relations, types of relations, closure properties, equivalence relations, partial ordering relations, n-ary relations.

UNIT-II

Functions: One-to-one onto and invertible functions, mathematical functions, exponential and logarithmic functions, sequences, indexed classes of sets, recursively defined functions, cardinality.

Logic and Propositional calculus: Propositions and compound propositions, basic logical operations, propositions and truth tables, tautologies and contradictions, logical equivalence, algebra of proposition, conditional and bi-conditional statements, arguments, logical implication, propositional functions, quantifiers, negation of quantified statements.

UNIT-III

Matrices: Matrix addition and scalar multiplication, matrix multiplication, transpose, square matrices, invertible matrices, inverse, determinants, elementary row operations, Gaussian elimination, boolean matrices.

UNIT-IV

Counting: Basic counting principles, factorial notation, binomial coefficient, permutations, combinations, the pigeon-hole principle, the inclusion-exclusion principle, ordered and unordered partition.

Probability Theory: Introduction, Sample space and events, finite probability space, conditional probability, independent events, independent repeated trials, binomial distribution, random variables.

UNIT-V

Property of Integers: Order and inequalities, absolute value, mathematical induction, division algorithm, divisibility, primes, greatest common divisor, Euclidean algorithm, fundamental theorem of arithmetic, congruence relation, congruence equations.

Recommended Books :

1. Lipschutz S., Lipson M. :Discrete Mathematics
2. Kolman B.,Robert C.B., Sharon R.: Discrete Mathematical Structures
3. Trembley J.P. and Manohar R.P. : Discrete Mathematical Structures with Applications to Computer Science.
4. Lew : Computer Science : A mathematical introduction

Paper VI (MIT - 106):PRACTICAL-I Computer Hardware Lab

Computer Hardware & Experiments based on Paper II

Paper-VII (MIT - 107):PRACTICAL -II Programming Lab

Unix/Linux Commands, Implementing simple algorithm to learn C , Programming using C to under stand different data structure and to implement different algorithm. Students are required to use compilers under UNIX/LINUX .

Paper VIII(MIT-108) Practical-III: Soft Skill Lab (AUDIT COURSE)

Section A: Oral Communication Competence 60 hrs

Section B: Group Discussion and Personality Development 60 hrs

Second Semester

Paper-I (MIT-201/MCA 301):Database Systems

UNIT - I

Introduction : Database system applications, database systems versus file systems, views of data, data models, database languages, database users and administrators, transaction management, database system structure, application architecture.

Data modeling using the Entity Relationship Model**:** ER model concepts, notation for ER diagram, mapping constraints, keys, concepts of super key, candidate key, primary key, unique key, generalization, aggregation, reduction of an ER diagram to tables.

UNIT - II

Relational model : Structure of relational databases, relational algebra, tuple relational calculus, domain relational calculus.

SQL : Characteristics of SQL, advantages of SQL, types of SQL commands, SQL operators and their procedure, tables, views and indexes, queries and sub-queries, aggregate functions, insert, update and delete operations, joins, union, intersection, minus, cursors in SQL. domain constraints, referential integrity, assertions, triggers, authorization and authentication.

UNIT - III

Relational database design & normalization : Functional dependencies, normal forms-First, second, third, BCNF, fourth and fifth normal forms, decomposition.

Indexing and Hashing: Basic concepts, ordered indices, B-tree, B+ tree, static hashing, dynamic hashing, comparison of ordered indexing and hashing, index definition in SQL, multiple-key access.

UNIT - IV

Query Processing & Optimization : Measure of query cost, selection operation, sorting, join operation, other operations, evaluation of expressions, estimating statistics of expression results, transformation of relational expression, evaluation plans, materialized views.

Transactions: Transaction concept, atomicity and durability, concurrent execution, serializability – conflict and view, testing of serializability.

UNIT - V

Concurrency Control : Concurrency Control, Locking Techniques for Concurrency control, Time stamping protocols for concurrency control, validation based protocols, multiple granularity, multi-version schemes, deadlock handling, insert and delete operations.

Recovery System : Failure classification, storage structure, recovery and atomicity, log based recovery, shadow paging, recovery with concurrent transactions, buffer management, backup systems.

Recommended Book : Database Systems Concepts - Korth
Fundamental of database system - Elmasiri and Navathe

Paper-II (MIT-202/MCA202):Operating systems

Unit I Introduction to Operating Systems, Computer System Structures and Operating System Structures

Introduction to Operating Systems: What is an operating system? Mainframe systems, desktop systems, multiprocessor systems, distributed systems, clustered systems, real-time systems, handheld systems. Feature migration and computing Environments.

Computer System Structures: Computer system operation. I/O structure, storage structure, storage hierarchy, hardware protection, network structure.

Operating System Structures: System components, operating system services. System calls, system programs, system structure, virtual machines.

Unit II: Processes and Threads

Processes: Process concept, process scheduling, operations on processes, cooperating processes, inter-process communication, communication in client-server systems.

Threads: Overview, multithreading models, threading issues.

Unit III CPU Scheduling, Process Synchronization and Deadlocks

CPU Scheduling: Basic Concepts, scheduling criteria, scheduling algorithms, multiple-processor scheduling, real-time scheduling, algorithm evaluation.

Process Synchronization: The critical section problem, synchronization hardware, semaphores, classical problems of synchronization, monitors.

Deadlocks: System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Unit IV Storage Management

Memory Management: Swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory: Demand paging, process creation, page replacement, allocation of frames, thrashing.

File System Interface: File concept, access methods, directory structure, file system mounting, file sharing, protection.

File-System Implementation: File system structure, file-system implementation, directory implementation, allocation methods, free space management, efficiency and performance.

Unit V Protection and Security

Protection: Goals of protection, domain of protection, access matrix, implementation of access matrix, revocation of access rights.

Security: The security problem, user authentication, program threats, system threats, security systems and facilities, intrusion detection, cryptography.

Paper-III (MIT-203/MCA-303):Algorithms

UNIT-1

Algorithms Analysis: Algorithms and structured programming. Analysing algorithms, Asymptotic behavior of an algorithm, Order notations, time and space complexities (polynomial, logarithmic and exponential), average and worst case analysis, lower and upper bounds.

UNIT-2

Algorithm design strategies: Divide and conquer (Merge sort, Quick sort, matrix multiplication).

Greedy method (knapsack problem, job sequencing with deadlines, minimum spanning trees).

Basic search & Traversal Techniques (Breadth first and Depth first traversals of Graphs).

UNIT-3

Dynamic programming: 0/1 knapsack, Travelling salesman problem

Backtracking: 8-queen problem, sum of subsets, Graph coloring, 0/1 Knapsack

Branch & Bound: 0/1 knapsack, Travelling salesman.

Algorithms on Graphs: Minimum cost spanning trees, depth-first search, bi-connectivity, strong connectivity, path finding problem, transitive closure algorithm

UNIT-4

Matrix algorithms: Basics, Strassen's matrix-multiplication algorithm, LU and LUP decomposition, inversion of matrices

Data structures for set manipulation problems: Fundamental operation on sets, a simple disjoint-set union algorithm, tree structures for UNION-FIND problem, applications and extensions of the UNION-FIND algorithm.

UNIT-5

Pattern matching algorithms: Finite automata and regular expression, recognition of regular expression, patterns, recognition of substrings, Conversion from NFA to DFA

Taxonomy of Classes: Problem classes P, NP, NP-hard and NP-complete, Theorems for some NP-complete problems

Text/Reference Books:

1. Fundamentals of Computer Algorithms, E. Horowitz, S. Sahni, Galgotia Publications, 1985.
2. Design & Analysis of Computer Algorithms, Av. Aho, J.E. Hopcroft, & J.D. Ullman, Addition Wesley, 1974.
3. Design and Analysis of algorithms, S.K. Basu, PHI Publications

Paper- III (MIT-204/MCA-204): Object Oriented Programming using C++

UNIT – I

Different paradigms for problem solving, need for OOP, differences between OOP and procedure oriented programming, abstraction, overview of OOP principles-encapsulation, inheritance and data binding polymorphism. abstraction.

C++ basics: structure of a C++ program, data types, declaration of variables, expressions, operators, type conversions, pointers and arrays, strings, structures, references, flow control statement, functions-scope of variables, parameter passing, recursive functions, default arguments, inline functions, dynamic memory allocation and deallocation operators.

UNIT – II

C++ classes and data abstraction: class definition, class structure, class objects, class scope, this pointer, static class members, constant member functions, constructors and destructors, dynamic creation and destruction of objects, friend function and class, static class member.

Overloading : function overloading, operator overloading – unary, binary operators.

UNIT - III

Inheritance: defining a class hierarchy, different forms of inheritance, defining the base and derived classes, access to the base class members, base and derived class construction, destructors, virtual base class.

Polymorphism: static and dynamic bindings, base and derived class virtual functions, dynamic binding through virtual functions, virtual function call mechanism, pure virtual functions, abstract classes, implications of polymorphic use of classes, virtual destructors.

UNIT - IV

Templates - function templates and class templates, overloading of function template, static class member in class template.

Exception handling: benefits of exception handling, throwing an exception, the try block, catching an exception, exception objects, exception specifications, rethrowing an exception, catching all exceptions.

UNIT-V

File handling : stream classes hierarchy, stream I/O, file streams, opening and closing data file, creating a data file, read and write functions, error handling during file operations, formatted I/O, sequential and random file processing.

Standard template library (STL): component of STL, containers, iterartors, algorithms, application of container classes.

Recommended book : Object Oriented Programming with C++ : E. Balagurusamy

Paper-V(MIT205/MCA-305) :Computer Networks

UNIT-I

Protocol Architecture : Overview: Communication model, Communication Tasks, Data Communication Networking: WAN, LAN,Wireless Networks. Basics of Network Software: Protocol and protocol architecture, Protocol functions, Design Issues for the layers, interfaces &Services, Connection oriented and connectionless services, service primitives, relationship of services to protocols , ISO REF Models, TCP/IP Model.

Data Communications: Data Transmission: Concepts of Frequency,Spectrum, bandwidth, Electromagnetic spectrum and frequencies for data communication, Fourier analysis , Data and signal, Transmission impairments, channel capacity, Nyquist bandwidth, Shannon capacity formula ,decibels and signal strength, Transmission media:Coaxial, twisted pair, Comparative study of Categories of cables, Coaxial, Optical Fibers, Wireless transmission: TerrestialMicrowave, satellite,Broadcast Radio,Infrared,.

UNIT-II

Data Encoding: BCA (NRZ,Bipolar AMI, B8ZS, HDB3,ASK,FSK,PSK,PCM,AM,FM,PM), Spread Spectrum. Asynchrous and Synchronous transmission, Full and Half duplex, Interfacing, Functional and Procedural aspects of V.24,

Data Link Control: Flow control: Stop and Wait, Sliding window, Error detection: Parity Check,CRC. Error control: Stop and Wait ARQ, Go back-N ARQ, Selective-Reject ARQ, Brief idea of HDLC and other Data Link control protocols

UNIT-III

Circuit Switching: Simple switching Network, Circuit Switching Networks, Circuit Switching Concepts: Space Division switching, Time Division Multiplexing, Routing in circuit switching Networks, Contrl Signalling, Inchannel & common channel signaling, Brief idea of SS7. Packet Switching: Packet switching principles, Routing,X.25

UNIT-IV

LAN Technology: LAN architecture, IEEE 802 standards, Ethernet (CSMA/CD): Medium Access Control, 10, 100, Gigabit Ethernet. Brief survey of other LAN systems (Token ring,FDDI,ATM, Fiber channel). Wireless LANS, Bridges, Latest trends in LAN technologies

LAN Devices: Study of specifications of L2 and L3 switches, Structured cabling, Passive components.

UNIT-V

Principles of Internetworking, connection less Internetworking, IP, IPv6, IP multicasting. Routing protocols, TCP, UDP, SNMP,SMTP and MIME, HTTP.

Recommended Books :

1. William Stallings: Data & Communications,Sixth Edition

2. A. S. Tanenbaum : Computer Networks

Paper-VI(MIT-206):Practical-I: OOPS Lab

C++ Programming problems based on course in paper – III & Paper IV

Paper-VII(MIT-207):Practical-II Database & Operating Systems Lab

UNIX based practical. Introduction to Linux, commands and shell programming, system programming.

Paper-VII(MIT-208):Practical-III Visual Programming Lab

Programming using Visual Basic .NET

Third Semester

Paper -I(MIT-301/MCA-501):Software Engineering

Unit I

Software Engineering Fundamentals: Definition of Software, Software characteristics, Software Applications.

Software Process: Software Process Models - Waterfall model, prototyping model, spiral model, incremental model, concurrent development model.

Project management Concepts: The Management Spectrum - The People , The Product , The Process , The Project.

Unit II

Software Process and Project Metrics : Measures , Metrics and Indicators , Software measurement : Size - Oriented Metrics , Function - Oriented Metrics , Extended Function point metrics

Software Project Planning : Project Planning Objectives , Software Project Estimation , Decomposition Techniques - Problem Based Estimation , Process Based Estimation ,Empirical Estimation Models- The COCOMO Model

Risk Analysis and Management: Software risks, Risk identification, Risk Projection, Risk Refinement, Risk Mitigation , Monitoring and Management.

Unit III

Software Quality Assurance: Basic concepts- Quality, Quality Control, Quality Assurance, Cost of Quality , Software Quality Assurance (SQA) , Formal Technical Review

Software Configuration Management: Baselines , Software Configuration Items, The SCM Process, Version Control, Change Control, Configuration Audit, Status Reporting.

Analysis Concepts and Principles: Requirements Elicitation for Software **,**Analysis Principles **-** The Information Domain, Modeling, Partitioning, Essential and Implementation Views, Specification: Specification Principles, Representation, The Software Requirement Specification (SRS)

Unit IV

Design Concepts and Principles: Design Principles , Design Concepts – Abstraction, Refinement, Modularity, Software Architecture, Control Hierarchy, Structural Partitioning, Data Structure, Software Procedure, Information Hiding , Effective Modular Design-Cohesion , Coupling

Software Testing: Testing Objectives & principles, Unit Testing, Integration Testing (Top Down Integration , Bottom Up Integration , Regression Testing, Smoke Testing), Validation Testing (Alpha and Beta Testing), System Testing (Recovery Testing, Security Testing, Stress Testing, Performance Testing).

Unit V

Reengineering: Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering

CASE Tools: What is CASE, Building Blocks of CASE, A Taxonomy of CASE Tools, Integrated CASE Environments, The Integration Architecture, The CASE Repository.

Recommended Books:

1. R. Pressman: Software Engineering, McGraw-Hill.
2. K.K. Agrawal and Y. Sing: Software Engineering, New Age International.
3. P. Jalote: Software Project Management in Practice, Pearson.

Paper-II(MIT-302/MCA-304): JAVA Programming

UNIT-I

Introduction to Java: Bytecode, features of Java, data types, variables and arrays, operators, control statements.

Objects & Classes: Object Oriented Programming, defining classes, static fields and methods, object construction

UNIT-II

Inheritance: Basics, using super, method overriding, using abstract classes, using final with inheritance.

Packages and Interfaces: Defining a package, importing package, defining an interface, implementing and applying interfaces.

UNIT-III

Exception Handling: Fundamentals, exception types, using try and cache.

Multithreaded Programming: Creating a single and multiple threads, thread priorities, synchronization.

UNIT-IV

Applets: Applets basics, applets architecture, applets skeleton, the html applet tag, passing parameters in applets.

Event Handling: Event classes and event listener interfaces.

UNIT-V:

Graphic Programming Introduction to swings.

Recommended Books :

1. P. Naughton and H. Schildt: The complete reference to Java, Tata Mc-Graw Hill.
2. Deitel and Dietel: How to program in Java

Paper-III(MIT-303/MCA-403):Network Management and Information Security

UNIT - I

Security and Cryptographic algorithm: Need for security, principle of security, types of attacks. Cryptographic techniques : cryptography terminology, substitution techniques, transposition techniques, Symmetric and asymmetric key algorithm, possible types of attack, key range, steganography. symmetric vs asymmetric, algorithm types and modes, DES, double and triple DES, AES, comparison of various cryptographic algorithm, requirement of good cryptographic algorithm.

UNIT - II

Asymmetric cryptographic algorithm and Message Authentication: Public key cryptography principles and algorithms, RSA algorithm, Diffe-Hellman key exchange. One way hash functions, message digest, MD5, SHA1, message authentication code, Digital envelope, Digital signatures.

UNIT - III

Network Management: Management Standards and Models, configuration management, configuration database and reports, fault management, identification and isolation, protecting sensitive information, host and user authentication, structure of management information, Standard management information base, SNPv1 protocol, acounting management, performance management, network usage, matrics and quotas.

Network security: Overview of IPV4: OSI model, maximum transfer unit, IP, TCP, UDP, ICMP, ARP, RARP and DNS, ping, traceroute. Network attacks: Buffer overflow, IP scheduling, TCP session hijacking, sequence guessing. Network scanning: ICMP, TCP sweeps, basic port scans. Denial of service attacks: SYN flood, teardrop attacks, land, smurf attacks. Visual and private network topology: tunneling, IPSEC. Traffic protocols: authentication headers, ESP internet key exchange, security association PPTP, L2TP.

UNIT - IV

Web Security and Application Security: Web servers and browsers: security features, server privileges, active pages, scripting, security configuration setting for browsers, security of active content: JAVA, JAVA script, Active x, plug-ins, cookies. SSL & SET, security mail: PEM and PGP.

Firewalls: Firewall characteristics & design principles, types of firewalls, packet filtering router, application level gateway or proxy, content filters, bastion host. Firewall architectures: dual homed host, screening router, screened host, screened suvnet. Firewall logs.

UNIT - V

Instruction detection system: component of an IDS, placement of IDS components, types of IDS: network based IDS, file integrity checkers, host based IDS, IDS evaluation parameters.

Recommended book: William Stallings: Network Security Essentials

Paper -IV(MIT 304/MCA 404):Computer Graphics

UNIT-1

Geometry and Line generation: Lines, Line segments and perpendicular lines, distance between a point and a line, vectors, pixels, frame buffers, vector generation, Bresenham's algorithm, anti-aliasing of line, thick line segments, character generation, display the frame buffer.

Graphics Primitives: Display devices, primitive operations, Display file interpreter, Normalized device co-ordinates, Display file structure and display file algorithms, Display control, text, Line style primitives.

UNIT-2

Polygons: Polygon representation, Entering polygons, Polygon interfacing algorithms, filling polygons, filling with a pattern, Initialization, Antialiasing.

Segments: Creation of segment, Closing, deletion and renaming segments, visibility, image transformations, saving and showing segments.

UNIT-3

2D and 3D Transformations: Matrices, Scaling transformations, Rotation, Homogeneous co-ordinates and Translations, Co-ordinate transformations, Rotation about an arbitrary point, Inverse transformations, Transformation routines, Transformation and patterns, Initialization, Display procedures. 3D geometry, 3D primitives and transformations.

UNIT-4

Windowing and Clipping: The viewing transformation and its implementation, Clipping, Cohen Sutherland Outcode algorithm, Clipping of polygons, generalized clipping, Multiple windowing, Parallel projection, Viewing projections and special projections, Conversion to view plane co-ordinates, Clipping in three dimensions, Clipping planes.

UNIT-5

Hidden surfaces and Lines: Back-face algorithm, Z-buffers, Scan line algorithm, Franklin algorithm, Illumination, Transparency, Reflection, Shadows, Ray tracing, halftones, Color Models

Text/Recommended Books:

1. Steven Harrington:- Computer Graphics: A programming Approach

Paper -VA (MIT305A/MCA-551):Embedded System Design

Unit I Overview and General Purpose Processor

Overview: Overview of embedded systems, Design challenges, common design metrics, processor technologies: general purpose processors, single-purpose processors, application specific instruction set processors, IC technologies- full custom/VLSI, semicustom ASIC, PLD , Design Technologies- compilation/ synthesis, libraries/ IP, test/ verification.

General-Purpose Processors: Basic architecture, datapath, control unit, memory, operation, instruction execution, pipelining, superscalar and VLIW architectures, programmers view, instruction set, program and memory data space, registers, I/O, interrupts, development environment, design flow and tools, debugging and testing, selecting a microprocessor.

Unit II Custom Processors

Custom-Single purpose processors: Custom single purpose processor design, optimizing custom single processors.

Standard single-purpose processors: peripherals Timers, counters, watchdog timers, UART, Pulse width modulator, LCD controller, Keypad controller, ADC, Real time clocks.

Unit III Application Specific Instruction Set Processors

Application Specific Instruction Set Processor (ASIP) Design: ASIP Design methodologies, steps involved in ASIP design: application analysis, design space exploration, generation of software tools like compiler, debugger, instruction set simulator etc., synthesizing processor. Simulation based and scheduler based design space exploration techniques and their comparison.

Unit IV Memory and Interfacing

Memory: Memory write ability and storage performance, Common memory types, composing memories, memory hierarchy and cache, advanced RAM: DRAM, FPM DRAM, EDO DRAM, SDRAM, RDRAM, Memory management Unit.

Interfacing: Arbitration, Muti-level bus architectures, Serial protocols: I2C bus, CAN bus, Fire Wire bus, USAB, Parallel protocols: PCI and ARM bus, Wireless Protocols: IrdA, Bluetooth, IEEE802.11.

Unit V Case Study

Case study of embedded system (Digital Camera): Introduction to a simple digital camera- user's perspective and designer's perspective, requirements specification- non functional requirements, informal functional specification, refined functional specification. Design alternatives- microcontroller alone, microcontroller and CCDPP, microcontroller and CCDPP/ Fixed-Point DCT, microcontroller and CCDPP/DCT.

Text Book:

1. Frank Vahid & Tony Givargi s: Embedded system design: A unified hardware/software Introduction, John Wiley & Sons Inc. 2002.

Paper -IVB (MIT 305B/MCA-541): DATA MINING

UNIT-I

Introduction to data mining: Basic data mining tasks, Data mining versus knowledge discovery in database, data mining issues and matrices, practical applications of data mining.

Basic concepts: Database/OLTP systems, Fuzzy sets and Fuzzy logic, information retrieval, Decision support systems, Dimensional modeling, Data warehousing, OLAP, Web search engines, Statistics, Machine learning, pattern matching.

UNIT-II

Data mining techniques: Statistical perspective on data mining, similarity measurements, decision trees, neural networks, and Genetic algorithms.

Classification: Issues in classification, Statistical based algorithms, distance based algorithms, decision tree based algorithms, neural network based algorithms, and rule based algorithms, combining techniques.

UNIT-III

Clustering: Similarity and distance measures, outliers, hierarchical algorithms: Agglomerative and divisive algorithms, partitional algorithms: Minimum spanning tree, Squared error clustering, K-Means clustering, Nearest neighbour, PAM, Bond energy, clustering with genetic, clustering with neural networks.

Clustering large databases: BRCH, DBSCAN, CURE, clustering with categorical attributes, comparison.

UNIT-IV

Association Rules:
Large item sets, basic algorithms: Apriority algorithms, sampling algorithm,

partitioning, parallel and distributed algorithms: Data parallelism and Task parallelism, comparing approaches, incremental rules, Advanced association rule techniques: Generalized Association rules, Multiple level, Quantitative association rules, Using Multiple minimum supports, Correlation rules, Measuring the quality of rules.

Web Mining:

Web content mining: Crawlers, Harvest system, Virtual Web view, personalization, Web structure mining: Page Rank, Clever, Web usage mining: Preprocessing, data structures, pattern discovery, pattern analysis.

UNIT-V

Spatial Mining:

Spatial data Overview: Spatial Queries, Spatial Data Structures, Thematic maps, and Image databases. Spatial data mining primitives, Generalization and Specialization: Progressive refinement, Generalization, Nearest Neighbour, STING Spatial rules, spatial classification algorithm:ID3 extension and Spatial Decision tree. Spatial clustering Algorithms: CLARANS, SD (CLARANS), DBCLASD, BANG, Wave cluster.

Temporal Mining:

Modeling Temporal Events, Time series: Time series analysis, Trend Analysis, Transformation, Similarity, Prediction, Pattern Detection, introductory concepts of Sequences and, Temporal association rules.

Introduction to data mining software.

Text Book: Data Mining: Introductory and Advanced Topics, Margaret H Dunham, Pearson Education 2003.

Paper –VC (MIT305C/MCA-553):Image Processing

UNIT - I

Image presentation and transform : Elements of visual perception, colour representation, Image capture, representation and storage. gray level transformation, histogram equalization, multi-image operations.

Image transform : Discrete Fourier transforms (DFT), Discrete cosine transform (DCT), Walsh-Hadamard transform, Haar transform, Karhunen-Loeve transform, singular value decomposition.

UNIT - II

Image enhancement : Contrast Intensification – linear stretching, Non-linear stretching, histogram specification, modifying gray level co-occurrence matrix, smoothing – image averaging, mean filter, order statistic filter, edge preserving smoothing, low pass filtering, Image sharpening – high pass filtering, homomorphic filtering.

UNIT - III

Image restoration: Mean square error restoration, least-square error restoration, restoration by singular value decomposition, restoration by maximum a posterior estimation, restoration by homomorphic filtering – distortion model and range of parameter, filtering procedure and related problems.

UNIT - IV

Image compression: Fidelity criteria, run length coding, Huffman coding, LZW, arithmetic coding, JPEG encoder and decoder , vector quantization compression.

UNIT - V

Image segmentation : Region extraction, pixel based approach, multilevel thresholding, local thresholding, region based approach – growing, splitting, merging, split and merge techniques.

Recommended books : Digital Image processing and analysis - B. Chandra and D. Majumder

Fundamental of digital image processing - Anil K. Jain

MIT 306: Paper VI Practical-I: Graphics & Java LAB : Based on paper-II & IV

MIT 307: Paper VII Elective Lab: Practical based on paper-V

Fourth Semester

Paper - I :(MIT - 401) Project Work

Only the projects submitted by the candidates as per following guidelines will be evaluated.

1. Project to be selected by the student at the end of fifth Semester
2. The project must be of approximately 400 man hours and so certified by the supervisor of the project
3. The project must be submitted in the form in consonance with the format enclosed
4. Monthly progress report must be submitted through supervisor in the enclosed format.
5. Project must be submitted before the prescribed last date .
6. Candidates are required to make a presentation of their project work during their project examination
7. Students whose Projects graded as unsatisfactory will given one more chance to undertake another project under another supervisor /organization.
8. The project work of the candidates whose monthly progress report is not submitted will be considered as incomplete and may be terminated within two weeks from the prescribed due date.
9. Students will be allowed to undertake project works only at the bonafide organizations.
10. Students are required to give two seminars during the project work, one at the end of 2nd month and another at the end of 4th month. However, candidates working for their project in organizations outside the state need to give only one seminar during the entire project period.
11. Examination of the project work will be conducted by a committee consisting of at least two internal examiners and one external examiner.

Guidelines for Project in partial fulfillment of the requirement of M.Sc.(IT)course

(a) The project will consist of two parts:
- Documentation; and
- Viva-voce

(b) The source-code and the executable code have to be submitted on CD and student must demonstrate working of the software.

(c) Project shall be original and not copied from the existing material from any source and a certificate, as per format given will be provided with the Project, duly countersigned by the supervisor.

(d) Project will be submitted only when the candidate completes all papers though he or she may start the projects earlier.

(e) Presentation of the Project will be in the accepted norms; as laid down in various text-books; IEEE standard/ ISO standards etc., are some models to follow.

(f) As far as possible, the Project should be of real life value.

(g) Though the Project is given 480 hours, the student is expected to use his/her discretion to ensure that it is large enough to be of practical value.

(h) The number of hours will not include the hours for writing and documentation of the Project.

(i) During the presentation of the Project at via-voce the candidate is advised to have a computer based or an overhead project presentation material handy.

PERFORMA FOR CERTIFICATE

This is to certify that this is a bonafied record of the Project entitled _____ was done satisfactory at _____ by Mr./Ms _____ in partial fulfillment of M.Sc.(IT) course. He/ She has successfully completed all the subjects.

This report had not been submitted for any other examination and does not form part of any other course undergone by the candidate.

PLACE:

DATE: SIGNATURE

NAME:
DESIGNATION:

(Name & Seal of organization of Supervisor)

PROFORMA FOR THE PROJECT REPORT

1. Title of the Project
2. Objectives
3. Input to the Project
4. Output generated
5. Details of Hardware Platform used
6. Details of Software Tools used
7. Implementation Issues (Clearly defining the area of Application).
8. Miscellaneous
9. Signature of the Candidature.

GUIDELINES FOR THE CHAPTERS AND SECTIONS

1. Microscopic Summary
2. Details of candidate and Supervisor along with certificates of :
    - Original Work;
    - Assistance if any;
    - Credits.
3. Aims and Objectives
4. Approach to Project and Time Frame
5. Project Design Description with Appendices to cover:
    - Flow Charts/Data Flow Diagram-Macro/Micro level
    - Source Code
    - Hardware Platform
    - Software Tools
    - Security measures
    - Quality Assurance
    - Auditability
6. Test Data and Result.

The project report must be prepared for the external examination. Monthly report of the students must be taken to monitor progress and must be placed for evaluation by external examiner. Projects submitted by the students shall be evaluated during external evaluation to ensure independent contribution and proficiency acquired by the students.

Note: Students must be allotted projects in the beginning of the session. Candidates submitting ready made projects/copied/ projects developed by professionals in the market etc shall be awarded zero marks.

Two copies of the project report and the software developed must be submitted to the external examiner. One copy of the project shall be returned to the student with the signature of external examiner.

APPENDIX-A

Syllabus for the Entrance Examination

Total 100 questions of multiple choice types will be set with 25 questions from Section-A, 25 questions from section-B and 50 questions from Section C. Each question will carry 1 mark for correct answer . The syllabus is given only as a broad outline. The standard of the entrance test shall be that required to test the candidate's capability to pursue the course. Mental ability will be that expected from graduate students and level of Information Technology will be that of O-level course of DOECC, Govt.of India.

SECTION-A

Mathematical ability:
Algebra: Sets, groups, fields, vector spaces, complex numbers, Matrices, determinants, relation between roots and coefficients of an equation, scalar and vector products, triple products

Calculus: Real number system, differentiation, integration, definite integral, evaluation of lengths and area of curves, tracing of curves, partial differentiation.
Geometry: 2 dimensions, straight lines, circles, parabola, hyperbola and ellipse, three dimensions: spheres, cones and cylinders
Real analysis: sequence of real numbers, convergence sequences, properties of continuous functions, maxima and minima

Statistics: Frequency distributions and measures of dispersion, permutation and combination, probability, binomial, Poisson, normal distribution, principle of least squares, correlation and regression, sampling and large sample tests, tests of significance

Section-B

Mental ability: Standard of the Mental ability tests will be that expected from degree holders

Section C:

Information Technology

Information concepts and processing: Definition, need, qualities, value of information, categories of information in business organization

Number systems: Binary numbers, octal numbers, Radix-decimal, hexadecimal ,binary and octal conversion from one form to another, Representation of decimal, octal, hexadecimal numbers, fractional and signed numbers,1's and 2's complements, binary arithmetic-addition, subtraction, multiplication and division. Codes: ASCII and EBCDIC code.

Logic Gates: Fundamental gates, universal gates, Demorgans theorem

Overview of a computer system: Stored program execution, components of a computer system, various I/O and auxiliary storage devices. Microcomputers, Microprocessors, Personal computers, Classification and generation of computers, Different CPU's used for making PC's-comparison. Specification of a standard computer system.
System software: high level language, assembly language machine level language. Compilers and Interpreters. Different programming languages, editors, word processors. Basics of DOS and Windows98.

Personal computing: Word processing , Spread sheet and database software packages, introduction to desk top publishing, desk top publishing software

Computer Communication: Basics of computer communication, LAN, Internet: Basic concepts and Internet tools (e-mail, ftp, telnet, www, gopher, archie etc), multimedia

Programming: Algorithm, flow chart, writing programs in C language