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Corrected MCA
20/9/2011

University of Rajasthan, Jaipur
Master of Computer Science Syllabus
Semester Scheme ~~2011-13~~ 2012-~~2014~~ 2013
I, II, III, Sem.

Contents:

1. NEW ORDINANCES RELATED TO Master of Computer Science (Semester Scheme)

O.199F1: The examination of Regular students of Master degree (Post-graduate) courses of the University admitted in the academic session 2011-12 and after shall be based on (a) Semester Examinations, (b) Continuous Assessment, (c) Choice Based Credit System, and (d) Semester Grade Point Average and Cumulative Grade Point Average system as provided in O.199F1to O.199F5. The ordinances which were in force prior to academic session 2011-12, will be applicable for Non-collegiate students (wherever permissible) and students admitted prior to academic session 2011-12 only. The ordinances O.199F1to O.199F5 will have overriding effect over other ordinances for the Regular courses leading to Masters' degree.

O.199F2: Fifteen (15) hours of theory teaching will lead to one credit (which means one hour per week theory teaching in a semester of 90 teaching days) and in case of practical 45 hours of laboratory work will lead to two credit (which means 3 hours practical class per week in a semester of 90 teaching days). Each semester of Master's course shall offer 36 credits or more. Number of Semester Examinations and Minimum Credit required to be earned for award of Master degree in various Post-Graduate courses is specified in table given below.

S. No	Faculty	Degree	Subject	Number of Semesters	Minimum Credit Required
1	Arts	M.A. (Master of Arts)	1. English	4	120
2			2. European Studies	4	120
3			3. French	4	120
4			4. Hindi	4	120
5			5. Philosophy	4	120
6			6. Sanskrit	4	120
7			7. Urdu	4	120

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8	Social Science	M.A. (Master of Arts)	1. Anthropology	4	120
9			2. Economics	4	120
10			3. Garment Production and Export Management	4	120
11			4. Geography	4	120
12			5. History	4	120
13			6. Mathematics	4	120
14			7. Political Science	4	120
15			8. Psychology	4	120
16			9. Public Administration	4	120
17			10. Sociology	4	120
18			11. Statistics	4	120
19		M.S.W. (Master of Social Work)		4	120
20		M.J.M.C.(Master of Journalism and Mass Communications)		4	120
21	Fine Arts	M.A. (Master of Arts)	Dramatics	4	120
22			Drawing and Painting	4	120
23			Music	4	120
24		M.V.A. (Master of Visual Arts)		4	120
25		M. Mus. (Master of Music)		4	120
26	Commerce	M.Com. (Master of Commerce)	Accountancy and Business Statistics	4	120
27			Business Administration	4	120
28			Economic Administration and Financial Management and Cooperation	4	120
29		M.C.C.A. (Master of Cost Control and Accounts)		4	120
30		M.H.R.M. (Master of Human Resource Management)		4	120
31		M.I.B. (Master of International Business)		4	120
32		M.F.C. (Master of Finance and Control)		4	120
33	Management	M.B.A. (Master of Business Administration)		4	120
34		M.B.A. (Executive) (Master of Business Administration (Executive))		4	120
35		M.B.A. (CAM) (Master of Business Administration-Computer Aided Management)		4	120
36		M.B.A. (E-Com) (Master of Business Administration-E-Commerce)		4	120
37	Education	M.Ed. (Master of Education)		2	60
38		M.P.Ed. (Master of Physics Education)		4	120
39		M.Lib. & Inf. Sc.(Master of Library and Information Science)		2	60
40	Law	LL.M. (Master of Law)		4	120

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41		LL.M. (H.R.&V.E.) (Master of Law –Human Rights and Value Education)		4	120
42	Science	M.Sc. (Master of Science)	1. Anthropology*	4	120
43			2. Biochemistry	4	120
44			3. Biotechnology	4	120
45			4. Botany	4	120
46			5. Chemistry	4	120
47			6. Environmental Science	4	120
48			7. Garment Production and Export Management*	4	120
49			8. Geography*	4	120
50			9. Geology	4	120
51			10. Home Science	4	120
52			11. Information Technology	4	120
53			12. Mathematics*	4	120
54			13. Microbiology	4	120
55			14. Pharmaceutical Chemistry	4	120
56			15. Physics	4	120
57			16. Psychology*	4	120
58			17. Statistics*	4	120
59			18. Zoology	4	120
60		M.C.A. (Master of Computer Applications)		6	180
61		B.Sc.-M.Sc. Integrated Biotechnology		10	300
62		B.Sc.-M.Sc. Integrated Information Technology		10	300
63		M.Tech. (Engineering Physics)		4	120
64	Engineering and Technology	Dual degree B.Tech. M.Tech. in Convergin g Technolog ies	1. Nanomaterials and Nanotechnology	10	300
65			2. Bioinformatics and Biotechnology	10	300
66			3. Information and Communication Technologies	10	300
67			4. Cognitive and Neuroscience	10	300

*Candidate who have been admitted to Master's degree in Anthropology/ Garment Production and Export Management / Geography/ Mathematics/ Psychology/ Statistics based on the Bachelor degree in Arts shall be awarded the M.A. degree in the concerned subject and candidates who have been admitted to Master's degree in Garment Production and Export Management based on the Bachelor degree in Commerce shall be awarded the M.Com. degree in the subject.

The number of papers, course type and credits and detailed syllabus for each course shall be shown in the syllabus for the course concerned. A candidate will be required to earn minimum credits prescribed above for award of the Master degree.

O.199F3:

The Department in context of this ordinance means the Department/Centre of concerned PG subject at University of Rajasthan or that of an affiliated institution or college, as the case may be. Teacher of parent Department means a duly appointed Teacher as per UGC prescribed qualifications in the Department where student is enrolled for the course.

a) A Credit Monitoring Committee (CMC) of the Department will consist of the Head and THREE Senior Most Teachers on roll of the Department with Head of the Department as Chairperson. Under special circumstance, when the number of teachers on roll is less than four, the Vice-Chancellor may constitute the Credit Monitoring Committee. Registration of candidates in the First and subsequent Semesters after the prescribed last date shall not be permitted. For subsequent semesters no minimum credit earning criterion will be applicable. Credit registration atleast once in all Compulsory Credit Course shall be binding, however, earning all CCC Credits for accumulation of the prescribed minimum credits shall not be required.

b) The candidate will be required to finalize the number of credits at the time of registration in a semester and no change will be permitted after seven days of start of the semester. The CMC of the Department shall forward the credit registration details of all students enrolled in the semester, latest by the tenth day of commencement of the semester. The prior approval of Credit Monitoring Committee will be essential and decision of Credit Monitoring Committee shall be final and binding.

c) The Credit Courses have been classified as
   i. Compulsory Core Courses(CCC)
   ii. Elective Core Courses(ECC),
   iii. Seminar (SEM), Project Work (PRJ), Field Study (FST), Self Study Courses(SSC), and other Supportive Courses (OSC), Research Publications [RPJ] can also be taken in support of Core or Elective course wherever so prescribed.

d) The aim of the seminar is to give students an exposure to recent developments and advance topics of research interest. The Seminar preparations can be undertaken only on prior approval of Credit Monitoring Committee of the Department. The CMC will allot Seminar Credits on Merit Basis out of desiring students. Seminar preparations are to be undertaken under guidance of a Teacher of parent Department. No teacher shall be permitted to guide more than three students in a semester for Seminar supervision. The guiding teacher will make continuous internal assessment of the Seminar. At the End of Semester Examination (EoSE) the Seminar will be conducted and credits will be awarded by a Board of Three Examiners consisting of the Head of the Department, guide and one faculty member other than guide.

e) The aim of Project Work or Field Study is to introduce students to research methodology in the subject and prepare them for pursuing research in theoretical or experimental or computational areas of the subject. The project work or Field Study is to be undertaken under guidance of a Teacher of thet Department or a Scientist or any

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other suitable person with proven research excellence in the concerned field of study. The Project Work or Field Study can also be taken up in an outside institution of repute on approval by Credit Monitoring Committee of the Department. The Project Work or Field Study can be undertaken only on prior approval of Credit Monitoring Committee of the Department. The CMC will allot Project Work or Field Study Credits on Merit Basis out of desirous students. The guiding teacher will make continuous internal assessment of the Project Work/ Field Study. No teacher shall be permitted to guide more than three students in a semester for Project Work/Field Study under his/her supervision. EoSE for Project Work/ Field Study will be held at the unit where project work has been undertaken by a board of three examiners consisting of HoD, guide and one senior faculty.

f) Each department is required to arrange delivery of all compulsory core courses and special number of elective core courses so that the students enrolled for the course can complete prescribed minimum number of credits. It is not binding on the Department to make provision for all elective core courses.

g) A course is identified by a course code designated by a string of six alphanumeric characters and a course title. In a course code the first three characters of the string indicate the Department offering the course and the later three alphanumeric characters designate a particular course In the case of compulsory core course the fourth character identifies the semester numeric digit and in case of the elective core courses the fourth character indicates the cluster of specialization. For compulsory theory core courses the fifth character is '0' , for laboratory core courses it is '1' and for Project Work/ Seminar/Field Study it is '2' and for Research Publications in journals it is '3'.

h) There will be no supplementary/due paper/special examination. Students with grade 'F" or 'E" will have to get themselves re-registered in the course if they so desire with option either as a Self Study Course or as a regular course depending on the feasibility at the Department. The credit will be considered and counted only if registered and approved by the Credit Monitoring Committee at the time of semester registration.

i) The candidate shall not be permitted to appear in EoSE of a particular credit if (i) he/she does not fulfil the minimum 75% attendance requirement, or (ii) he/she fails to secure a Semester Grade Point Average (SGPA) of 1.5 in the continuous assessment. The concerned department will have to communicate the eligibility of candidate for EoSE to the University Fifteen days before commencement of Examination.

O.199F4: In Continuous Assessment (Department/ College/Institution wise) and End of Semester Examination (EoSE) examination (University as a whole) separate Grades will be awarded as specified under this ordinance. The continuous assessment will consist of two components, namely, (i) Internal Assessment and (ii) Sessional Test(s) in ratio 30:70. The internal assessment component will comprise of assessment of students performance on the basis of factors like Attendance, Classroom Participation, Quiz, Home Assignment etc. The sessional test shall be conducted on coverage of 50% of course content specified in the syllabus. The Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) for Continuous Assessment will be calculated on the Department/College level and

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for EoSE at the University level. The name of College/Department will be mentioned with SGPA and CGPA of Continuous Assessment.

O.199F5:

a) Grades in a particular examination with less than 10 students registered in the course (cumulative at Department level for continuous assessment and cumulative at university level for EoSE) will be awarded on the basis of percentage of marks obtained as per table given below.

Percentage Range	Grade	Grade Point	Grade Definition
75-100	O	6	Outstanding
65-74	A	5	Very Good
55-64	B	4	Good
45-54	C	3	Average
33-44	D	2	Below Average
25-33	E	1	Poor
0-24	F	0	FAIL

b) Grades in a particular examination with more than 10 students registered in the course (cumulative at Department level for continuous assessment and cumulative at university level for EoSE) will be calculated on the basis of relative merit of marks obtained, that is, Grade O (Point 6) to top 10% students, Grade A (Point 5) to next 25 % students in merit order, Grade B (Point 4) to further next 30% students in the merit order and Grade C (Point 3) to further next 25% in the merit order and Grade D (Point 2) to remaining last 10% students with exceptions permitted (i) to the extent to award students with same mark and the same grade, (ii) to award Grade E (Point 1) to those students securing less than 33% but more than 25% marks in the examination, and (iii) to award Grade F (Point 0) to those students securing less than 25% marks in the examination. The grade point assignment is also given below in tabular form.

Standing in Merit of the Course or Marks Obtained in the course	Grade	Grade Point	Grade Definition
Top 10 % in Merit	O	6	Outstanding
Among Top 35% in Merit but not in Top 10%	A	5	Very Good
Among Top 65% in Merit but not in Top 35%	B	4	Good
Among Top 90% in Merit but not in Top 65%	C	3	Average
Among Last 10% in Merit	D	2	Below Average
25% <Marks<33%	E	1	Poor
Marks<25%	F	0	FAIL

c) Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) will be calculated on the credit weighted average of the grade points obtained

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as given below.

$$SGPA=\frac{\sum_{i=1}^{n} C_i P_i}{\sum_{i=1}^{n} C_i}$$

Where

C_i: Number of credits earned in the i^{th} course of Semester for which SGPA is to be calculated.

P_i: Grade Point Earned in i^{th} course

i: 1, 2, ...n represents the number of courses in which a student is registered in the concerned semester.

$$CGPA=\frac{\sum_{i=1}^{n} C_i P_i}{\sum_{i=1}^{n} C_i}$$

Where

C_i: Number of credits earned in the i^{th} course of Course till date for which CGPA is to be calculated.

P_i: Grade Point Earned in i^{th} course

i: 1, 2, ...n represents the number of courses in which a student is registered in the concerned semester.

d) The SGPA, CGPA grades will be assigned as per table given below.

SGPA or CGPA	Grade	Definition
5.50 to 6.00	O	Outstanding
4.50 to 5.49	A	Very Good
3.50 to 4.49	B	Good
2.50 to 3.49	C	Average
1.50 to 2.49	D	Below Average
0.50 to 1.49	E	Poor
0.00 to 0.49	F	FAIL

e) The University will issue a complete transcript of credits, grade obtained, SGPA and CGPA on declaration of each semester result and a consolidated one on the accumulation of minimum credits required for the award of Master degree.

f) The maximum period for accumulation of the credit for Award of Master degree is 5 years (8 years for Ten Semester courses). Failing which the credits earned will stand withdrawn and null and void.

g) The details of conversion of seven point scale into percentage as per UGC notification is given below

SGPA or CGPA	Grade	Definition	Percentage
5.50 to 6.00	O	Outstanding	75-100
4.50 to 5.49	A	Very Good	65-74
3.50 to 4.49	B	Good	55-64
2.50 to 3.49	C	Average	45-54
1.50 to 2.49	D	Below Average	33-44

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0.50 to 1.49	E	Poor	25-33
0.00 to 0.49	F	FAIL	0-24

Thus the percentage will be obtained by using this table

CGPA	%	CGPA	%	CGPA	%
6	**100**	4	**60**	2	**39**
5.9	**95**	3.9	**59**	1.9	**37.8**
5.8	**90**	3.8	**58**	1.8	**36.6**
5.7	**85**	3.7	**57**	1.7	**35.4**
5.6	**80**	3.6	**56**	1.6	**34.2**
5.5	**75**	3.5	**55**	1.5	**33**
5.4	**74**	3.4	**54**	1.4	**32.2**
5.3	**73**	3.3	**53**	1.3	**31.4**
5.2	**72**	3.2	**52**	1.2	**30.6**
5.1	**71**	3.1	**51**	1.1	**29.8**
5	**70**	3	**50**	1	**29**
4.9	**69**	2.9	**49**	0.9	**28.2**
4.8	**68**	2.8	**48**	0.8	**27.4**
4.7	**67**	2.7	**47**	0.7	**26.6**
4.6	**66**	2.6	**46**	0.6	**25.8**
4.5	**65**	2.5	**45**	0.5	**25**
4.4	**64**	2.4	**43.8**	0.4	**20**
4.3	**63**	2.3	**42.6**	0.3	**15**
4.2	**62**	2.2	**41.4**	0.2	**10**
4.1	**61**	2.1	**40.2**	0.1	**5**

The enhancement of CGPA by 0.01 will enhance percentage as given below:

Grade	SGPA or CGPA	Percentage enhancement on 0.01 CGPA enhancement
O	5.50 to 6.00	0.5
A	4.50 to 5.49	0.1
B	3.50 to 4.49	0.1
C	2.50 to 3.49	0.1
D	1.50 to 2.49	0.12
E	0.50 to 1.49	0.08
F	0.00 to 0.49	0.5

For example (i) CGPA of 5.73 is equivalent to 86.5%, (ii) CGPA of 5.12 is equivalent to 71.2%, (iii) CGPA of 4.34 is equivalent to 63.4%, (iv) CGPA of 3.26 is equivalent to 52.6%, (v) CGPA of 2.17 is equivalent to 41.04%, and (vi) CGPA of 1.11 is equivalent to 29.88%.

2. Eligibility:

All the graduate (with 10+2+3) with at least 50% marks or CGPA of 3.0 in the UGC Seven Point scale [45% marks or CGPA 2.5 in the UGC Seven Point Scale for

As per Univ Website

SC/ST/Non-Creamy layer OBC] in aggregate with mathemateics either at XII level or graduation level or BCA/B.Sc. (IT)/ B.Sc.(CS) or B.E. from recognized university in Rajasthan and min. 60% marks for Non- Rajasthani Candidate. Reservation as per University Rules.

3. **Scheme of Examination:**

(1) Each theory paper EoSE shall carry 100 marks The EoSE will be of 3 hours duration. Part 'A' of theory paper shall contain 10 Short Answer Questions of 20 marks, based on knowledge, understanding and applications of the topics/texts covered in the syllabus. Each question will carry two marks for correct answer.

(2) ~~Part "B" of paper will consisting of Four questions with internal choice (except in cases where a different scheme is specifically specified in the syllabus_ of 20 mark each. The limit of answer will be five pages.~~ (*)

(3) Each Laboratory EoSE will be of four/six hour durations and involve laboratory experiments/exercises, and viva-voce examination with weightage in ratio of 75:25.

4. Course Structure:

The details of the courses with code, title and the credits assign are as given below.

Abbreviations Used

Course Category

CCC: Compulsory Core Course
ECC: Elective Core Course
OEC: Open Elective Course
SC: Supportive Course
SSC: Self Study Core Course
SEM: Seminar
PRJ: Project Work
RP: Research Publication

Contact Hours

L: Lecture
T: Tutorial
P: Practical or Other
S: Self Study

Relative Weights

IA: Internal Assessment (Attendance/Classroom Participation/Quiz/Home Assignment etc.)
ST: Sessional Test
EoSE: End of Semester Examination

(*) Part B of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of Each unit. ~~Each~~ Each question carry ~~equal~~ 20 marks.

First Semester

S. No.	Subject Code	Subject Title	Course Category	Credit	Contact Hours per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1	MCA 101	Computer Architecture	CCC	4	3	1	0	3	0
2	MCA 102	Operating System Fundamentals	CCC	4	3	1	0	3	0
3	MCA 103	Data Base Management Systems	CCC	4	3	1	0	3	0
4	MCA 104	Algorithm and Data Structures	CCC	4	3	1	0	3	0
5	MCA 105	Programming in C	CCC	4	3	1	0	3	0
6	MCA 106	Discrete Mathematics	CCC	4	3	1	0	3	0
7	MCA 111	Programming in C & DS Lab	CCC	4	0	0	6	0	4
8	MCA 112	DBMS Lab	CCC	4	0	0	6	0	4
9	MCA 113	Office Management Lab	CCC	4	0	0	6	0	4

Second Semester

S.No.	Subject Code	Subject Title	Course Category	Credit	Contact Hours per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1	MCA 201	Object Oriented Programming Using C++	CCC	4	3	1	0	3	0
2	MCA 202	System Analysis and Design	CCC	4	3	1	0	3	0
3	MCA 203	Computer Oriented Numerical Methods	CCC	4	3	1	0	3	0
4	MCA 204	Data Communication and Computer Networks	CCC	4	3	1	0	3	0
5	MCA 205	Web Design and Development	CCC	4	3	1	0	3	0
6	MCA 206	Computer Graphics	CCC	4	3	1	0	3	0
7	MCA 211	Event Driven Programming (VB) Lab	CCC	4	0	0	6	0	4
8	MCA 212	Programming in C++ Lab	CCC	4	0	0	6	0	4
9	MCA 213	Web Authoring Tools Lab	CCC	4	0	0	6	0	4

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Third Semester

S. No.	Subject Code	Subject Title	Course Category	Credit	Contact Hours per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1	MCA 301	Programming in Java	CCC	4	3	1	0	3	0
2	MCA 302	Software Engineering	CCC	4	3	1	0	3	0
3	MCA 303	Linux and Shell Programming	CCC	4	3	1	0	3	0
4	MCA 304	Application Development Using .NET Frame Work	CCC	4	3	1	0	3	0
5	MCA 305	Data Warehousing & Data Mining	CCC	4	3	1	0	3	0
6		Core Elective – 1	ECC	4	3	1	0	3	0
7	MCA 311	Programming in Java Lab	CCC	4	0	0	6	0	4
8	MCA 312	Linux OS and Shell Programming Lab	CCC	4	0	0	6	0	4
9	MCA 313	NET Lab	CCC	4	0	0	6	0	4

Fourth Semester

S. No.	Subject Code	Subject Title	Course Category	Credit	Contact Hours per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1	MCA 401	Computer Based Optimization Techniques	CCC	4	3	1	0	3	0
2	MCA 402	Advanced Java Programming & Technology	CCC	4	3	1	0	3	0
3	MCA 403	Advanced Database Systems	CCC	4	3	1	0	3	0
4	MCA 404	Management Information System	CCC	4	3	1	0	3	0
5	MCA 405	E-Commerce	CCC	4	3	1	0	3	0
6		Core Elective – 2	ECC	4	3	1	0	3	0
7	MCA 411	Advanced Java Lab	CCC	4	0	0	6	0	4
8	MCA 412	Advanced DBMS Lab(Oracle/DB2/MySQL)	CCC	4	0	0	6	0	4
9	MCA 423	Mini Project	PRJ	4	0	0	6	0	4

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Fifth Semester

S. No.	Subject Code	Subject Title	Course Category	Credit	Contact Hours per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1	MCA 501	Information Security & Cryptography	CCC	4	3	1	0	3	0
2	MCA 502	Wireless Technology	CCC	4	3	1	0	3	0
3	MCA 503	Analysis and Design of Algorithms	CCC	4	3	1	0	3	0
4	MCA 504	Simulation & Modeling	CCC	4	3	1	0	3	0
5		Core Elective – 3	ECC	4	3	1	0	3	0
6		Core Elective – 4	ECC	4	3	1	0	3	0
7	MCA 511	ADA Lab	CCC	4	0	0	6	0	4
8	MCA 522	Mini Project	PRJ	4	0	0	6	0	4
9	MCA 523	Seminar	SEM	4	0	0	6	0	4

Sixth Semester

S.No.	Subject Code	Subject Title	Course Category	Credit	Contact Hours per Week			EoSE Duration (Hrs.)	
					L	T	P	Phy	P
1	MCA 621	Major Project : Minimum Four Months in an Organization approved by the Director/Head of the Centre/Department	PRJ	36	0	0	54	0	4

ELECTIVE CORE COURSES

Elective Course Code	Specializatio	Paper Title	Prerequisite	Semester
MCA A01	ECC	Advanced Computer Architecture		III
MCA A02	ECC	Grammar Based Processing		III
MCA A03	ECC	Theory of Computing		III
MCA A04	ECC	Digital Image Processing		III
MCA B01	ECC	Network Management		IV

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MCA B02	ECC	Artificial Intelligence		IV
MCA B03	ECC	Compiler Design		IV
MCA B04	ECC	Multimedia Systems		IV
MCA C01	ECC	Bio-Informatics		V
MCA C02	ECC	Geo-Informatics		V
MCA C03	ECC	ERP Systems		V
MCA C04	ECC	Embedded Systems		V
MCA D01	ECC	Mobile Communication & Network		V
MCA D02	ECC	Object Oriented Software Engineering		V
MCA D03	ECC	Web Information System		V
MCA D04	ECC	Pattern Recognition Systems		V

MCA101: Computer Architecture

Unit – I

Logic gates, basic combinational logic, Boolean functions & Expressions, multiplexer, decoders, encoders comparators, adder and substructures, BCD to 7 segment decoder, sequential circuits, RS, JK, D and T flip flops, counter and shift register. Clock and Timing events.

Unit – II

Addressing methods and machine program sequencing-memory locations addresses, encoding of information, instructions types, Instruction format, and instructions sequencing, addressing modes, paging, relative, indirect and indexed addressing.

Basics of Computer organization: System buses and instruction cycles, memory subsystem organization and interfacing, I/O subsystem organizations and interfacing, Register transfer languages.

Unit – III

CPU design: Specifying a CPU, design and implementation of a simple CPU (fetching instructions from memory, decoding and executing instructions. establishing required data paths, design of ALU, Number representation, Arithmetic operations, floating poit arithmetic, design of the control unit and design verification), design and implementation of a simple micro-sequencer.

Unit – IV

Memory Organization : Main memory concepts, Auxiliary memory, Associative memory, virtual memory & paging and cache memory organization.

Input and Output organization: Asynchronous data transfer, programmed I/O Interrupts (types, processing of interrupts implementing interrupts inside CPU) Direct memory access, I/O processors, serial communication.

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Recommended reference/text books

1. John D. Carpinelli: Computer Systems Organization & Architecture;3rd Edition; Person Education Asia, 2008.
2. M. Morris Mano : Computer System Architecture; III Edition; Prentice Hall of India, 2008.
3. Malvino B.; Digital Computer Electronics; III Edn;TMH.
4. John P. Hayes, Computer Architecture and Organization, McGraw Hill International Edition.
5. Vincent J P Heuring and Harry F Jordan: Computer Systems Design & Architecture, Addison Wesley, Pearson Education Asia.

MCA 102: Operating System Fundamentals

Unit – I

Necessity of an Operating system, Operating system structure, Evolution of Operating Systems (multiprogramming systems, batch systems, timesharing system, distributed systems and Real-time system). Operating system structure, Operating system components and services. System calls, system programs, Virtual machines.

Unit – II

Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Inter-process communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.

Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

Unit – III

Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management, Swap-Space management, Disk reliability.

Unit – IV

Goals of Protection, Domain of protection, The Security problem, Program threats, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption. Computer Security techniques.

Case Study : Windows NT – Design principles, System components, Environmentals subsystems, File system, Networking and program interface.

Recommended books:

1. Galvin P.B., Silberschatz ; Operating System Principles; (Seventh Edition);J. Wiley, 2008.
2. Willium Stalling; Operating Systems : Internal & Design Principles; Sixth Edn; Pearson., 2009.
3. Gary Nutt: Operating Systems-A Modern Perspective (Second Edition), Pearson Education, 2008.
4. Tanenbaum A.S., Modern Operating Systems, 2nd Edn., PHI Publ,2003.
5. D.M. Dhamdhere: Systems Programming and Operating Systems (Second Edition), Tata Mc-Graw Hill Publishing Company Limited.
6. Harvey M. Deitel, Operating Systems, Pearson Education.

MCA 103: Database Management Systems

Unit - I

Overview of DBMS : Basic concepts, Database system architecture, Schemas, Instances, Components, Database users, Three-tier architecture, Centralized, Distributed and Client/Server architecture, Data independence. Database models: Entity relationship model, hierarchical model, relational model, network model, Object-Oriented data model.

Data Modeling using ER Model : ER model concepts, ER diagram, mapping constraints, Keys, Generalization, aggregation, reduction of ER diagrams to tables, extended ER model, Relationship of higher degree. Enhanced ER Model : Concepts, Specialization, Generalization, Data abstraction, Knowledge representation and University EER Model as example.

Unit - II

Relational Model : Concepts, Constraints, languages, Relational database design by ER & EER mapping; Relational algebra, relational calculus.

Normalization : Functional dependencies, Normal forms – First, second, third and BCNF, inclusion dependencies, loss less join & decompositions, normalization using FD, MVD, and JDs, Alternative approach to database design.

Unit - III

Data storage : Magnetic disk and flash storage, RAID technology, tertiary storage. Indexing structure- Single and multiple level.

Transaction processing : Transactions atomicity, durability, serializability and isolation. Concurrency control techniques – Two phase locking, timestamp ordering, multiversion,

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granularity locking techniques. Database recovery techniques based on deferred & immediate updates and shadow paging.

Unit - IV

SQL: Characteristics of SQL, advantages, data types in SQL, SQL Operators, types of SQL commands, Tables, Indexes, Views, Nulls, Aggregate Functions, Select statement, Sub queries, Insert, Update and Delete operations, Joins, Unions. Introduction to Embedded SQL, Dynamic SQL & SQLJ. Data security, integrity and concurrency, Backup and recovery, numeric and text data in SQL, dealing with dates, Synonyms, Snapshots, Programming with SQL.

Reference Books :

1. Korth H F and Silberschataz A, Database System Concepts, Sixth Edition; McGraw Hill,2006.
2. Navathe S.B., Elmasri R.; Fundamentals of Database Systems, Fifth Edition; Pearson. 2009.
3. Leon, and Leon, SQL, Tata McGraw Hill Pub. Co. Ltd.
4 Ivan Bayross: SQL SQL /PL · 4th Edn: BPB, 2009
5. Ramakrishan and Gharke, Database Management Systems, 3rd Edition; Tata Mc Graw Hill, 2003.
6. Date C J, Database Management Systems, Pearson Education Asia.
7. Singh S.K.; Database Systems; I Edition; Pearson, 2006.

MCA 104: Algorithm and Data Structures

Unit – I

Algorithms, pseudo code, efficiency of algorithms, analyzing algorithms and problems, complexity measures, basic time analysis of an algorithm, space complexity. Data abstraction and basic data structures, data types and abstract data types.

Basic data structure – Arrays, Stack, Queues and their applications, linked and sequential representation of arrays, stacks & queue.

Unit – II

Linked lists, representation of linked list in memory. insertion, deletion and searching of linked list, two way lists. Arithmetic expressions, Polish notations, dequeue and priority queues.

Trees : Basic concepts, linked representation, representation in continuous memory. Binary and N-ary trees, Searching, insertion and deletion in binary search tree, traversing algorithms

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using stacks, header nodes, threads.

Unit – III

Graphs and their representations, sequential representation- Adjacent matrix, linked representation of graphs, operations on graph, , traversing a graph. DFS and BFS algorithms. Heap structures , heap sort algorithm.

Unit – IV

Sorting and Searching: Use various data structures for searching and sorting, Internal and external sorting techniques, linear and binary search, Hash tables & Hashed searching, Bubble sort, Insertion sort, Selection sort, Merge sort, Radix sort, quick sort.

Recommended reference books

1. S. Lipschutz: Data Structures;Mc Graw Hill International Edition, 2008.
2. A.V. Aho., J.E. Hopcroft, and J.D. Ullman, Data Structures and Algorithms, 3rd Edition; Pearson Education Asia, 2008.
3. Salaria R.S.; Data Structure and Algorithms Using C/C++; 4th Edition; Khanna.
4. Patel R.B : Expert Data Structures with C: 2nd Edition; Khanna
5. A. Michael Berman: Data Structures via C++. Oxford University Press.
6. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data structures with applications, TMH Publishing Co.Ltd.

MCA 105: Programming in C

Unit – I

Problem solving with computers, Flow charts, Basic concepts of programming languages, Programming domains.
C Character set, variables and constants, keywords, Type checking, Scope and lifetime data types. Operators, Instructions, assignment statements, arithmetic expression, comment statements, simple input and output, Boolean expressions.

Unit – II

Control structures, decision control structure, loop control structure, case control structure. String and character handling, arrays and string processing, data validation examples.
Functions, function prototype, subroutines, scope and lifetime of identifiers, parameter passing mechanism, recursion.

Unit – III

User defined data types, enumerated data types., unions, structures, array of structures,

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Unions of structures. Storage class specifiers, Pre processors, header files and standard lib. Functions.

Pointers : Definition and uses of pointers, pointer arithematic, pointers and arrays, pointers and functions, pointer to pointer, pointer to structures. Dynamic memory allocation.

Unit – IV

Console Input and Output functions, data files, operations on data files, text and binary files, formatted data files.

Implementation of simple data structures : Stacks, Queues, Linked Lists, trees, searching and sorting algorithms.

Interaction with hardware, system calls, command line arguments, operations on bits, Bit-fields. Graphics in C

Recommended reference books

1 Gottfried B.; Programming with C : Schaum Outlines; Tata Mc Graw Hill Edition.

2 Balagurusamy E.; Programming in ANSI C ;Fifth Edn; Mc Graw Hill,2011.

3 Kanetkar Y.; LET US C; X Edition; BPB,2010.

4 Deitel HM & Deitel JP; C How to Program; 5th Edn; Pearson Pub.

MCA 106: Discrete Mathematics

Unit – I

Set Theory: Ordered set, Cartesian product of sets, partition of set, countable and uncountable sets, Russell's paradox, principle of inclusion-exclusion, mathematical induction.

Relations and Function: Binary relation, n-ary relation, representation of a relation by a directed graph and matrix, equivalence relation, partial order relation, partially ordered set, total order relation, dual of partial order relation, hasse-diagram, chains and anti-chains.

Modules function, greatest integer function, hash function, composition of function, pigeonhole principle.

Groups, Rings And Fields: Definition and simple examples of Groups, Rings, Integral Domains, fields.

Unit – II

Logic & Proofs: Propositions, Basic logical operations, truth tables, Logical equivalence, Algebra of Propositions, conditional and Bi-conditional propositions, De Morgan laws for logic, Tautologies & contradiction, Quantifiers, Arguments, Logic Inference, Direct Proofs, Proof by contradiction.

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Lattices, Boolean Algebras, Switching Circuits & Digital Logic Gates: Definition & examples of lattices, Elementary properties of lattices, Distributive lattice, Bounded lattice, Complemented lattice, Dual of lattice.

Boolean Algebra, Boundaries laws, absorption laws, Idempotent laws, Involution laws, cancellation laws, associative laws, De' Morgan's laws, Boolean expressions and functions, Disjunctive normal form, conjunctive normal form.

Switching circuits, Equivalent switching circuits, combination of switches, digital logic gates.

Unit – III

Graph Theory: Simple and multi-graph, Types of simple graph (Regular graph, complete graph, Bipartite graph, cycle, wheel, planner graph, complementary graph) directed graph, Connectedness, in graph, Euler graph, Hamiltonian graph weighted graph, shortest path problems, traveling salesman problems, Euler formula, operations on graphs, sub graph colouring of graphs, chromatic number.

Trees: Properties of Trees, eccentricity of vertex, centre of graph, Radius & diameter of graph, sub tree, Rooted tree, Binary tree, M-ary tree, Height of Binary tree, Spanning tree, Kruskal's Algorithm, Minimal spanning tree

Unit – IV

Recurrence Relation & Generating Function: Discrete numeric function, generating function, Recurrence relations, Homogeneous linear Recurrence relation with constant coefficients.

Finite State Machine: Finite state machines as models of physical systems, equivalent machine, finite state machine as language recognizes, finite state language & type-3 languages.

Recommended Books:

1. C.L.Liu "Elements of Discrete Mathematics" ; 12th Edition;Tata McGraw-Hill Pub. Comp. Ltd.,2000.
2. John Truss " Discrete Mathematics for Computer Scientists"- Peason Education, Asia
3. Kenneth H. Rosen " Discrete Mathematics & its Applications";6th Edition; Tata McGraw-Hill Pub. 2007.
4. Seymour Lipschutz, Mare Lars Lipson and Varsha H. Patil "Discrete Mathematics" ; 2nd Edition; Tata McGraw-Hill Pub. Comp. Ltd., India. 2008.
5. Chaurasia VBL, Srivastava A.; Discrete Mathematics; 5th Edition; Genius; 2010.
6. Johnson Baugh; Discrete Mathematics; 5th Edition; Pearson; 2002.
7. Bernard kolman, Robert C.Busby and Sharon Culter Ross "Discrete Mathematical Structures" Prentice Hall of Indian New-Delhi.

MCA 111: Programming in C & DS Lab

Practical Lab
Examination : Practical Examination

Lab Exercises based on Theory paper MCA 104 and MCA 105

MCA 112: DBMS Lab

Practical Lab :)
Examination : Practical Examination

Lab Exercises based on Theory paper MCA 103

MCA 113: Office Management Lab

Practical Lab
Examination : Practical Examination

Word processing, Spread sheet program, data processing, Presentation Program, Web Surfing and other Internet services.

MCA 201: Object Oriented Programming Using C++

Unit – I

Need of Object Oriented Programming, Advantages of OOP, Comparison of Functional Programming and OOP Approach, Essentials of OOP (Objects, classes, Encapsulation, Data abstraction, Inheritance, Reusability, Polymorphism, Delegation, Message Communication).

C++ Basics : Preprocessors, Comments, Data types, Operators, Expressions, Loops and Decisions, Arrays and String handling, Modular Programming with Functions, Structure and Unions.

Unit – II

Pointers and Run time binding, Dynamic memory allocation, Storage class specifiers. Classes, Member functions, Objects, Arrays of objects. Pointers : Addresses and pointers, pointer & arrays, pointer & functions, use of pointers in strings and pointers to objects. and Classes, Nested classes, Constructors, Destructors, Inline member functions, Friend Functions, Static member function.

Inheritance, Single Inheritance, types of base classes, types of derivations, multiple inheritance, container classes, member access control.

Unit – III

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unctions Overloading, Operator Overloading, polymorphism, early binding, polymorphism with pointers, Unary and Binary Operator Overloading, Overload Assignment Operator, Copy Constructor, Data Conversion between Objects of different classes. C++ Free Store.

Virtual Function : Virtual function, late binding, pure virtual functions, Abstract classes, Generic Programming with Templates, Friend functions, Overloaded Function Templates, Multiple Arguments function Template.

Unit – IV

Stream Computation with Console, Stream Computation with Files, opening and closing of files, stream state member functions, binary file operations, structures and file operations, classes and file operations, random access file processing. Exception handling : Exception handling mechanism, Throwing mechanism, Catching mechanism. Implementation of basic data structures in C++ such as arrays, stack , queues, linked list and sequential representation.

Recommended Books

1. Herbert Schildt; C++ : The Complete Reference; 4th Edn; TMH, 2003.
2. Robert Lafore; Object Oriented Programming in C++; 4th Edition; Techmedia
3. Balagurusamy E., Object Oriented Programming C++; 4th Edition; TMH, 2009.
4. Venugopal, Rajkumar; Mastering C++; Tata Mcgrow Hill, 2006.
5. Kanetkar Y.; LET US C++; BPB; 2009.
6. Deitel and Deitel: How to Program C++, addison Wesley, Pearson Education Asia
7. John R. Hubbard, Programming with C++, McGraw Hill International.

MCA 202: System Analysis and Design

Unit - I

System Concepts and the Information Systems Environment: The System concept, Definition, System, Central Objectives, Elements of a system, Environment , Boundaries and Interfaces. Types of systems – Physical or Abstract systems, Open or Closed systems, Role, Need and Responsibility of System Analyst, Introduction to System Development Approaches – Data Oriented and Object Oriented.

Unit - II

System Development Life Cycle : Linear or Waterfall Cycle, Linear cycle phase, problem definition, system specification. System study, Analysis, Design, Development, Implementation, Testing, Maintenance, Documentation.

System Planning and Analysis : Strategies for determining information requirement, Problem definition & Project initiation, Background analysis, Data and Fact Gathering Techniques, Feasibility Studies-Technical, Operational, economic, Cost benefit analysis.
Interface design tools, user interface evaluations, Introduction to Process Modeling,

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Introduction to Data Modeling. Introduction to Prototyping.

Unit - III

System Design : Process modeling, Physical and logical design, Conceptual data modeling, Entity Relationship analysis, ER modeling, Context diagram,. Tools of structured analysis (DFD, Data Dictionary, Decision Tree, Decision tables, Structured English). Structure Charts, Modules, Parameter passing. Execution sequence, Structured Design, Conversion from Data Flow Diagrams to Structure Charts.

Input/ Output Forms Design : Requirement of forms design, User Interface Design, Input design, CRT Screen forms design, Output design.

Unit - IV

Files organization and Database Design : Designing of Fields, Physical records, Physical files, Database design, Data Structures, Normalization. Introduction to CASE Tools, Features, advantages, and limitations of CASE tools.

System Implementation, Maintenance and documentation, Testing, Evaluation, Maintenance Activities, Documentation, Document Configuration Maintaining a configuration.

Computer system audit and Security : Uses of Computer system audit, Types of threats to Computer system and Control measures, Threat and Risk Analysis, Disaster Recovery and Consistency planning.

Recommended Books

1. Awad E.M.; System Analysis and Design; Second Edition; Galgotia Publication., 2004.
2. Igor Hawryszkiewyez, Introduction to System Analysis and Design, 4th edition. Prentice-Hall.
3. jain Mdhulika, Jain Satish; Structured System Analysis and Design;2nd Edition, 2007.
4. Jeffrey L. Whitten, and Lonnie D. Bentey,Systems analysis and Design Methods 4th edition, Tata McGraw-Hill.
5. Philip L Weaver, Practical SSADM wer 4+A Complete Tutorial Guider, Pitman publishing.
6. Don Yeates, Maura Shields and David Helmy. System Analysis and Design Longman group limited.

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MCA 203- COMPUTER ORIENTED NUMERICAL METHODS

Unit – I

Floating Point Arithmetic- Representation, Operation, Normalization; Pitfalls of Floating-point Representation, Errors in Numerical computation, Measures of Accuracy.

Locating Roots of Equations: Bisection Method, Newton's Method, Secant Method, Muller's Method .

Unit – II

Interpolation and Numerical Differentiation: Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation Formula.

Numerical Integration Definite Integral, Trapezoid Rule, Simpson's Rule, Romberg Algorithm, Adaptive Simpson's Scheme, Gaussian Quadrature Formulas.

Unit – III

Solution of Linear Equations: Gaussian Elimination, Gaussian Elimination with Scaled Partial Pivoting, Iterative Solution of Linear Systems, Gauss-Seidel Iteration Method, Power Methods, Eigenvalues and Eigenvectors.

Ordinary Differential Equations Initial-Value Problem: Analytical vs. Numerical Solution, Taylor Series Methods, Runge-Kutta Methods, Euler method.

Unit – IV

Smoothing of Data and the Method of Least Squares, Least Squares curve fitting, Straight line and non-linear curve fitting, Cubic Splines, Chebyshev polynomials.

Random Numbers, Estimation of Areas and Volumes by Monte Carlo Techniques.

Recommended Books:

1. Rajaraman V : Computer Oriented Numercial Methods, 3rd Edition; PHI,2005.
2. R.S. Salaria ; Computer Oriented Numerical Methods; 4th Edition; Khanna Publ,
3. Balagurusamy E.; Numerical Methods; I Edition; Mc Graw Hill., 2010.
4. Sastri; Introductory methods of Numerical Analysis; 3rd edition;PHI, 2001.
5. K.Sankara Rao, Numerical Methods for Scientists and Engineers, Prentice Hall India.
6. Cheney and David Kincaid, *Numerical Methods and Computing,* Brooks/le, 2004
7. Krishnamurthy E. V. , Sen S. K. : Computer Based Numercial Algorithms, East-West Press

MCA 204: Data Communication and Computer Networks

Unit – I

Overview of Data Communication and Networks : Basic concept -Computer communication methods, Data Transmission modes, Signals; Modulation - Principles of

Modulation, AM and FM Modulator Circuits, Pulse Code Modulation, signaling and decoding. Digital Band-pass Modulation. Demodulation - detection, signals and Noise, Detection of Binary Signal in Gaussian Noise, Demodulation of shaped Pulses, Digital Band Pass Demodulation.

Network Models : Internet model, OSI seven layer network model, Functions of OSI layers, LAN technologies - protocols and standards, LAN hardware, TCP/IP (Protocols, architecture, layers, services).

Unit – II

Data transmission : Data Communication Systems, DTE-DCE Interface, Modems, Transmission media(Guided & Unguided). Multiplexing - FDM, WDM, TDM, Digital Subscriber Line (Operation, Layers, Traffic control), FTTC, Error detection and correction; Microwave- Electromagnetic spectrum, Characteristics, use of MIW in communications; PM Microwave Radio Repeaters. Satellite - Artificial Satellite, Geosynchronous Satellites, Orbital classification, Spacing and Frequency allocation, Multiple accessing.

Optical fiber communication : Basic concept of light propagation, Fiber Cables, Light sources, Optical Detectors, Fiber cable losses, wave division multiplexing, fiber distributed data interface. the fiber channel.

Unit – III

Internet : Internet Architecture, Internet protocol and datagram, Routing protocols, UDP, Internet standard services, DNS.

Networking Technologies, ISDN(Services, Channels, Layers, Broadband ISDN), Cable Modem System, SMDS, Frame relay, fast Ethernet, 100VG-anyLAN and Gigabit Ethernet, FDDI and CDDI, Asynchronous Transfer, SONET(architecture, layers, frame, applications), DWDM Switching and Virtual LAN, Non-ATM Virtual LANs, IEEE 802.1Q VLAN standard, X.25 protocols, ATM (architecture, layers, classes, services).

Networking and Internetworking Devices : Repeaters, Bridges, Routers, Gateways and roles of these devices in communication.

Unit – IV

Network Performance, Analytical approaches, simulation, traffic monitoring. Network Management - SNMP, RMON and RMNv2, TMN, Directory services and network management.

Issues related to network reliability and security, SSL and VPN, Introduction only to firewalls and Kerberos, Cyber Laws.

Recommended Books :

1. Behrouz A Foruzan, Data Communication and Networking; 3rd Edition; Tata McGraw Hill., 2004.
2. Behrouz A Foruzan, TCP/IP Protocol Suite; 2nd Edition; Tata McGraw Hill., 2003.
3. Stalling William ;Data and Computer Communication; 8th Edition Pearson, 2009.

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4. Tannenbaum ; Computer Networks;4th edition; PHI, 2008.
5. Wayne Tomasim Electronic Communications Systems, Pearson, Education Asia.
6. M.A. Miller, Data and Network Communications, Thomosn Learning.
7. Gilbert Held, Understanding Data Communication, Techmedia.
8. Fred Harshal, Data Communications Communications Networks, Pearson Education Asia.

MCA 205: Web Design and Development

Unit – I

Creating and Maintaining Web Sites: Planning, Navigation and Themes, Site types and Architecture, Elements of a Web page(Pages & Layout, Text, Colour, Images, GUI Forms & GUI Features), steps of creating a site, Web site Planning, Web Site Designing Process, publishing and publicizing site/structuring web site. The Web Medium, Web Searching, Adding Search facility, Optimizing for Search Engines, Site Maps and other Navigation Aid , Site Delivery and Management.

Unit – II

Introduction of HTML and XHTML : introduction, markup language, editing HTML & XHTML . common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML/XHTML tables : intermediate tables and formatting , forms, more complex forms, internal linking, creating and using image maps.

Unit – III

Java script - introduction to scripting language, memory concepts, arithmetic, decision making. Java script control structures, Java script functions, program modules in java script, function definitions, duration of identifiers, scope rules, recursion, java script global functions.

Java script arrays: introduction, array-declaring and allocating memory, passing arrays to functions, multiple subscripted arrays. Java script objects- introduction, math, string, data, Boolean and number objects etc.

Introduction to PHP : Advantages of PHP, Functions , Data types, Arrays, SQL, Connecting Databases using ODBC, Files, Forms, Images, Imap objects.

Unit – IV

Dynamic HTML : CSS : introduction - inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the box model, user style sheets.

Dynamic HTML: object model and collections: introduction, object referencing, collections all and children, dynamic style, dynamic positioning, using the frames collection, navigator object.

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Dynamic HTML: event model : introduction, event ON CLICK, event ON LOAD - error handling with ON ERROR, tracking the mouse with event, more DHTML events. Filters and Transitions: Dynamical HTML: Client side scripting with VB script: Introduction - operators- data types and control structures - VB script functions - arrays -string manipulation classes and objects.

Recommended Books

1. M.L. Young: Complete Reference b: Internet; 2nd Edition; Tata Mc Graw Hill, 2006.
2. Thomas A. Powel ; Web Design : C.R.; Second Edition; TMH, 2009.
3. Thomas A. Powel ; HTML & XHTML : C.R.; Fourth Edition; TMH, 2008.
4. Harely Hahn: The Internet, Tata Mc Graw Hill.
5. G. Robertson: Hands on HTML, BPB Publications.
6. D.A. Tauber, B. Kienan: Microsoft From Page 2000, BPB Publications.
7. Joel Sklar: Principles of Web Design, BPB Publications.

MCA 206: Computer Graphics

Unit – I

Introduction: Elements of graphics workstation. Video Display Devices. Raster Scan Systems. Random Scan systems. Input devices. Graphics Software Coordinate Representations,

Algorithms: Line drawing algorithms- DDA Algorithm. Bresenham's Line Algorithm. Frame buffers. Midpoint Circle Algorithm. Midpoint Ellipse Algorithm, Sean-line polygon fill algorithm. Inside-Outside tests. Scan- Line fill of curved Boundary Areas. Boundary fill Algorithm. Flood fill Algorithm.

Unit – II

Graphics Primitives: Primitive Operations, The display file interpreter, Normalized Device Coordinates. Attributes of output primitives: Line attributes, Color and gray scale levels. Color-tables. Gray scale. Area- Fill Attributes, Fill styles. Pattern fill. Soft fill. Character Attributes.

Geometric Transformations: Matrices. Scaling Transformations. Sin and Cos Rotation. Homogeneous Co-ordinates and Translation. Co-ordinate Translations. Rotation about an arbitrary point. Inverse Transformations, Scaling Transformation, Reflection and Shear transformations, Transformations Routines.

Unit – III

2-D Viewing- The viewing pipeline. Viewing co-ordinate, Reference Frame. Windows to view ports . co-ordinate transformation 2-D Viewing functions. Clipping operations point clipping. Line clipping. Cohen- Sutherland. Line Clipping. Polygon clipping. Sutherland Hodge man clipping.

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3-D concepts: Three dimensional Display Methods, Parallel projection. Perspective projection. Visible line and surface identification. Surface rendering. Three Dimensional Object representations. Bezier curves and surfaces. B-Spline curves and surfaces. Visibility, Image and Object Precision Z-buffer algorithm.

Unit – IV

Computer Animation : Design of Animation Sequence. General Computer Animation Function – Raster animations, Key Frame system, Morphing, Simulating Accelerations, Motion Specifications, Kinematics and Dynamics.

Recommended Books :

1. Hearn D., Baker P.D.; Computer Graphics; 2nd edition;Pearson, 2003.
2. Foley J.D.; Van D.A.; Fundamentals of Interactive Computer Graphics; 2nd Edition; Addision-Wiley, 2000.
3. Ronger D.F.; Elements of Computer Graphics;
4. Giloi W K ; Interactive Computer Graphics; PHI
5. Mewman W, Sproul R.F.; Principles of Interactive Computer Graphics; Mc Graw Hill.

MCA 211: Event Driven Programming (VB) Lab

Practical Lab
Examination : Practical Examination –
Event driven programming: objects, properties, methods, events, Development environmental forms controls, menus dialogs Data types, data structures, control structures, subprograms, intrinsic functions, error handling, file handling. Multiple Form Programming - Information Kiosks

MCA 212: Programming in C++ Lab

Practical Lab :
Examination : Practical Examination –
Exercises based on the Theory paper MCA 201.

MCA 213: Web authoring Tools Lab

Practical Lab :
Examination : Practical Examination

Exercises based on the Theory paper MCA 205.

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Course Content in Detail- MCA III Semester (2012-2013)/2013-2014

IV

Note :

1. Papers I to V are compulsory and paper VI is elective core course. Elective core course will be chosen out of four elective core courses.
2. Internal assessment will be done by teacher concerned on the basis of test papers, regularity in the class and performance of the candidate. Maximum marks in internal assessment of each paper is 100.

MCA 301 : Programming in Java

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit – I

Introduction to OOP: Paradigms of Programming Languages - Basic concepts of Object Oriented Programming , Objects and Classes, Data abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication; Benefits of OOP; Application of OOPs.

Introduction to Java : History, Java features, Java Environment- JDK, API. Types of Java program, Creating and Executing a Java program; Java Tokens: Keywords, Character set, Identifiers, Literals, Separator; Java Virtual Machine (JVM); Command Line Arguments; Comments in Java program.

Elements: Constants, Variables, Data types, Scope of variables, Type casting. Operators- Arithmetic, Logical, Bit wise operator, Increment and Decrement, Relational, Assignment, Conditional, Special operator; Expressions, Evaluation of expressions.

Unit – II

Decision making and Branching: If statement and its types,; switch statement; Decision making and Looping-While loop, do While, for loop, break, labeled loop, continue Statement.

Arrays: One Dimensional Array, Multidimensional Array, Vectors, Wrapper classes; String Array, String Methods, String Buffer Class.

Class and objects : Defining a class, Methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members, Nesting of Methods, this keyword, command line input .

Inheritance: Defining a subclass, deriving a sub class, Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Overriding methods, Final variables and methods, Final

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classes, Finalizer methods, Abstract methods and classes, Visibility Control- Public access, Private access, friend, protected. Interfaces- Multiple Inheritance, Defining interface, Extending interface, Implementing Interface, Accessing interface variables.

Unit – III

Packages: Java API Packages System Packages, Naming Conventions, Creating & Accessing a Packages Finding Packages and CLASSPATH, Adding Class to a Packages, Hiding Classes.

JAVA Streams : Data Flow with Java Streams, Input Streams, Output Streams.

Exception Handling: Limitations of Error handling, Advantages of Exception Handling, Types of Errors, Basics of Exception Handling, try blocks, throwing an exception, catching an exception, finally statement. declaring and throwing custom Exceptions.

Multithreading: Creating Threads, Life of a Thread, Defining & Running Thread, Thread Methods, Thread Priority, Synchronization, Implementing run-able interface, Thread Scheduling.

Unit – IV

Collections : The Collection Framework, The Collection Classes, implementation of List, Set and Map Interface, Accessing a Collection via an Iterator, Object Ordering, The SortedSet and SortedMap Interface, Comparators.

GUI in Java : Aplet and its uses; Abstract window tool kit, Event Handlers , Event Listeners. AWT Controls and Event Handling -- Labels, TextComponent, ActionEvent, Buttons, CheckBoxes, ItemEvent, Choice, Scrollbars, Layout Managers, Input Events, Menus; Introduction to Swing

Networking: Java utility for networking, Manipulating URLs, Reading a file on a Web server, Establishing simple Client Server.

Recommended reference/Text books:

1. Patrick Naughton, Herbert Schildt:, Java, The Complete Reference: 7th Edition Osborne/McGraw-Hill 2006.
2. E. Balagurusamy :Programming with Java - Tata McGrawhill Publishers , II Edition.
3. Khalid A. Mughal, Rolf W. Rasmussen; A programmer's Guide to Java Certification(2nd Edn).
4. Cay S. Horstmann, Gary Cornell; Core Java Vol I & II; The Sun Micro systems Press.
5. Ken Arnold , James Gosling:Core Java Fundamentals (Volume 1 and Volume 2). 2nd Edition-, Addison Wesley
6. Kathy Sierra , Head First Java, 2nd Edition , Orielly
7. Bruce Eckel: Thinking in Java, 4th Edition

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MCA 302 : Software Engineering

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit I

Systems concepts and definitions: System's theory, Definition of System, System Characteristics/ features, System Components, System Thinking, Introduction to Software Engineering.
Information Systems - Types of Information Systems, Information Systems Development Methodologies; System Project Planning, Management; Application of Engineering Approach to Computer Software Design and Development.

Unit II

Information systems Models and Planning : Brief Evolution of Software Engineering; Role of Software Engineer; Software Life Cycle ; Types of Software Life Cycle Activities; Typical Documents; Software Life Cycle.
Life Cycle Models -The Linear Sequential Model, Waterfall Model, The Prototyping Model, Incremental Model, Boehm's Spiral Model.
Software requirement and specifications-Object models, Data Flow Model, Behavioral Modeling, Data Dictionary, System Diagram, IEEE standards for Software Requirement specifications (SRS).

Software Planning and Cost Estimation - Project Planning; WBS- Work Break Down Structure; PERT; Software Cost Estimation.

Unit III

Software Design Methodologies : Software Design Methodologies - Phase of the Design Process, Design Concept, Measuring Cohesion, Measuring Coupling, Requirement Traceability.
Structured Analysis and Modeling techniques; Process modeling; Logic modeling; Data modeling etc.; User Interface and Database Design; Principles of User Interface Design. Object Oriented design process and evaluation.

Validation and Verification- Verification and validation; Software testing- Strategic approach to software testing , System testing, Component testing, Test case design, Critical system validation.

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Unit IV

Software Project management, Quality assurance and Maintenance: Software Project Management- Management Approach, Team Approach, Critical Practices, Capability Maturity Model; Metrics for Process and Project - Metrics for Process, Project, software measurement, software Quality and Integrity. Earned Vale Analysis, Error Tracking, Postmortem Review. Software Quality Assurance - Formal Inspection and Technical Review, Software reliability, Statistical Quality assurance; Risk management. Maintenance and Configuration; Documentation of System and Project using structured Approaches. Emerging technologies- Introduction to Security engineering, Service- Oriented s/w engineering, Aspect-Oriented s/w engineering and S/W Reengineering. CMM level- 5 (~~Comp~~ Concept and advantages)

Reference/Text Books

1. Jalote, Pankaj (1997) An ntegrated Approach to Software Engineering, 2nd ed. Springer.
2. Pressman, Roger (2001) Software Engineering: A Practitioner's Approach, 5th ed. M Graw-Hill.
3. Sommerville Lan; Software Engineering; 8th Edition; Pearson Education.
4. Schach, Stephen R. (2002) Classical and Object-Oriented Software Engineering, 5th ed. IRWIN.
5. Hoffer, Jeffrey A.; Joey F. George; and Joseph S. Valacich (1999) Modern Systems Analysis and Design. Massachusetts: Addison-Wesley

MCA 303 : Linux and Shell Programming

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit – 1

The Operating System: Linux history, Linux features, Linux distributions, Linux's relationship to Unix, Overview of Linux architecture, Installation, Booting, Login and Shutdown Process, Start up scripts, controlling processes, system processes (an overview), Linux Security, Networking on Linux. User Management: Types of users, The powers of Root, managing users (adding and deleting): using the command line, shell scripts and GUI tools.

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Unit – II

The Linux File System: Basic Principles, Pathnames, Mounting and Un-mounting File Systems, Different File Types, File Permissions, Disk Usage Limits, Directory Structure, Check and Repair File Systems; Security and file permissions. Shell in Linux: Available shells under Linux, different

shell features, shell commands, shell scripts: shell variables, environmental variables, purpose of shell scripts, writing, storing and executing scripts.

Unit – III

Filters- The grep family, advanced filters-sed and awk. vi editor: General startup of vi editor and it modes , Creating and editing files, features of vi, screen movement , cursor movement, insertion, deletion, searching, submitting operations, yank, put, delete commands, reading & writing files, advance editing techniques, vim (improved vi).

Shell: meaning and purpose of shell, introduction to types of shell. The command line, standard input and standard output, redirection, pipes, filters special characters for searching files and pathnames.

Unit – IV

Shell Programming: shell meta character, local and global shell variables - interactive shell scripts — shell script arguments — looping and making choice, for loop, case, while and until, shell functions, eval.

Networking : Networking tools, E-mail, Remote login, FTP, Network and Server setup, LAN, Connection with Internet, Setting-up Routers, Proxy Servers, Print-Server, File server, mail Server, Web server and Database server.

Recommended reference/Text books:

1. Beginning Linux Programming, N.Matthew, R.Stones,Wrox, Wiley India Edition.
2. Peterson Richard, "The Complete References Linux", Tata McGraw Hill.
3. Sumitabha Das, "Unix/Linux Concepts & Applications", Tata McGraw Hill
4. Yshavant P. Kanetkar, Shell Programming
5. Linux System Programming, Robert Love, O'Reilly, SPD.
6. Vijay Shekhar: Red hat linux study guide, firewall media.
7. Richard Petersen; The Complete Reference : LINUX; TMH.

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MCA 304 : Application Development Using .NET Frame Work

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit – I

Introduction to .NET framework : Managed Code and the CLR, Intermediate Language, Metadata and JIT Compilation, Automatic Memory Management.

Language Concepts and the CLR: Visual Studio .NET, Using the .NET Framework.

The Framework Class Library:.NET objects - ASP .NET, .NET web services, Windows Forms.

Elements : Variables and constants, data types, declaration. Operators, types, precedence. Expressions. Program flow, Decision statements, if ... then, if..then..else, select..case, Loop statements, while..end while, do..loop, for..next, for..each..next.

Types: Value data types, Structures, Enumerations. Reference data types, Single-dimensional, Multi-dimensional arrays, jagged arrays and dynamic arrays.

Unit – II

Windows programming: Creating windows Forms, windows controls, Button, Check box, Combo box, Label, List box, Radio Button, Text box. Events, Click, close, Deactivate, Load, Mousemove, Mousedown, MouseUp.

Menus and Dialog Boxes: Creating menus, menu items, context menu, Using dialog boxes, showDialog() method.

ADO.NET: Architecture of ADO.NET, ADO.NET providers, Connection, Command, Data Adapter, Dataset. Connecting to Data Source, Accessing Data with Data set and Data Reader, Create an ADO.NET application, Using Stored Procedures.

Unit – III

ASP.NET Features: Applications of States and Structure; Change the Home Directory in IIS - Add a Virtual Directory in IIS- Set a Default Document for IIS - Change Log File Properties for IIS - Stop, Start, or Pause a Web Site.

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Creating Web Controls: Web Controls, HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications, Data Controls and Adding web controls to a Page.

Creating Web Forms: Server Controls, Types of Server Controls, Adding ASP.NET Code to a Page.

Unit – IV

Overview of XML :XML Serialization in the .NET Framework -SOAP Fundamentals-Using SOAP with the .NET Framework.

Web Services and WCF : Web Services protocol and standards – WSDL Documents - Overview of UDDI - Calling a Web Service from a Browser - Calling a Web Service by Using a Proxy - Creating a simple web service - Creating and Calling a Web Service by Using Visual Studio .NET. Architecture of WCF, WCF Client.

Reference Books:

1. Matthew MacDonald : Beginning ASP.NET 4.0 in C# 2010 , 3rd Edition , APres.
2. Bill Evjen, Scott Hanselman, Devin Rader : Professional AS P.NE T 4 , 2010 , Willey.
3. George Shepherd :Microsoft ASP.NET Step by Step, 2010 , Microsoft press.
4. Imar Spaanjaars :Beginning ASP.NET 4: in C# and VB (Wrox Programmer to Programmer) ,2010,Wiely Publishing.
5. Steven Holzner; ASP.NET 4.0 (Cover C# & VB) Black Book; Dreamtech Press.
6. Steven Holzner; .NET Programming, Black Book; Dreamtech Press.

MCA 305 : Data Warehousing & Data Mining

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

UNIT I

Introduction to Data Warehousing : Introduction, Data Warehouse, importance and functions, Multidimensional Data Model, Data Marting and it's usage, Cost of data marting, Metadata, Data Warehouse Architecture, Building a Data warehouse , Implementation, Further Development. Planning and Project Management of Data Warehouse.

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UNIT II

Data Mining : Data Warehousing to Data Mining, Evolution Analysis, Classification of Data Mining Systems, Architecture of data mining system, Major Issues in Data Mining. Data Preprocessing : Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation; Analysis of Attributes Relevance, Discriminnating between Different Classes. Data Warehouse and OLAP Technology for Data Mining.

UNIT III

Association Rules : Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases. Issues regarding classification & prediction, Different Classification Methods, Prediction.

UNIT IV

Clustering and Applications of Data Mining : Cluster Analysis, Types of Data, Categorization of Major Clustering Methods, Kmeans, Partitioning Methods. Hierarchical Methods, Density-Based Methods, GridBased Methods, Model-Based Clustering Methods, Clustering High Dimensional Data, Constraint Based Cluster Analysis, Outlier Analysis. Data Mining Applications.

Future Trends : Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, Web Mining, Spatial Mining, Temporal Mining, Applications and Trends in Data Mining.

Text/Reference Books :

1. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
2. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
3. Data Warehousing; Reema Thareja; Oxford
4. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION.
5. Data Warehousing in Real World - Anahory, Pearson Education.
6. Data Mining Techniques – ARUN K PUJARI, University Press.
7. Building the Data Warehouse-W.H.Inmon,3rd Edition, Wiley, 2003.
8. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.

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MCA 306 A01: Advanced Computer Architecture

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit – I

Instruction level parallelism (ILP)- over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP. IA 64 and Itanium processors. ILP software approach- compiler techniques- static branch protection - VLIW approach - H.W support for more ILP at compile time- H.W verses S.W Solutions.

Unit – II

Multiprocessors and thread level parallelism - Symmetric and distributed shared memory architectures-distributed shared memory- Performance issues -Synchronization – Models of memory consistency- Introduction to Multithreading.

Unit – III

Storage systems- Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time –Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system.

Unit – IV

Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture - heterogeneous multi-core processors – case study: IBM Cell Processor.

Recommended reference/text books:

1. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier)
2. "Computer Architecture and parallel Processing" Kai Hwang and A.Briggs International Edition McGraw-Hill
3. Advanced Computer Architectures, Dezso Sima, Terence Fountain. Peter Kacsuk, Pearson.
4. Parallel Computer Architecture, A Hardware / Software Approach, David E. Culler, Jaswinder Pal singh with Anoop Gupta, Elsevier

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MCA 306A02: Grammar based Processing

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

UNIT-1

N-grams Models of Syntax: Counting Words in CorporaSimple (Un smoothed) Ngrams, Smoothing , Add-One Discounting, Witten-Bell Discounting, Good- Turing Discounting, Backoff, Combining Backoff with Discounting, Deleted Interpolation, Ngrams for Spelling and Pronunciation, Real Word Spelling Errors, N-grams for Pronunciation Modeling, Entropy, Cross Entropy for Comparing Models.

HMMs and Speech Recognition: Introduction to Speech Recognition, Overview of a Speech Recognition Architecture, Overview of Hidden Markov Models, The Viterbi Algorithms, Advanced Methods of Decoding, A * Decoding, Acoustic Processing of Speech, Sound Waves, How to Interpret' a Waveform, Spectra, Feature Extraction, Computing Acoustic Probabilities, Training a Recognizer.

UNIT-11

Word Classes and Part-of-Speech Tagging: English Word Classes, Tagsets for English, Part of Speech Tagging, Rule-Based Part of Speech Tagging, Stochastic Part of Speech Tagging, The Actual Algorithm for HMM Tagging, Transformation-Based Tagging, How TBL Rules are Applied, How TBL Rules-are Learned, Multiple Tags and Multiple-Words, Unknown Words, Class-based N-grams

Context Free Grammars for English Syntax: Constituency, Context-Free Rules and Trees, Sentence-Level Constructions. The Noun Phrase, Before the Head Noun.After the Noun, Coordination, Conjunction, Agreement, The Verb Phrase and Subcategorization, Spoken Language Syntax, Disfluencies, Prosody, Grammar Equivalence and Normal Form, Finite-State Grammars and Context-Free Grammars, Grammars and Human Processing.

UNIT-1II

Parsing with Context Free Grammars: Parsing as Search, Top-down Parsing, BottomUp Parsing, Comparing Top-down and Bottom-up parsing, A Basic Top-Down Parser, Adding Bottom-up Filtering, Problems with the Simple Top-Down Parser, Left-recursion Ambiguity, Repeated Parsing of Subtrees, The Earley Algorithm, Dynamic Programming and its Relation to Chart Parsing and Viterbi, Finite-State Parsing Methods.

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Features and Unification: Feature Structures ,Unification of Feature Structures, Feature Structures in the Grammar, Agreement, Head Features, Subcategorization, Long Distance Dependencies, Implementing Unification, Unification Data Structures, The Unification Algorithm, Unification Parsing, Integrating Unification into an Earley Parser, Types and Inheritance, Extensions to Typing, Other Extensions to Unification .

UNIT-1V

Lexicalized and Probablistic Parsing: Probabilistic Context-Free Grammars, Probabilistic CYK Parsing of PCFGs, Learning PCFG Probabilities, Problems with PCFGs, Probabilistic Lexicalized CFGs, Dependency Grammars, Human Parsing.

Language and Complexity: The Chomsky Hierarchy, How to tell if a language isn't regular, Pumping Lemma, Are English and other Natural Languages Regular? Is Natural Language Context-Free, Complexity and Human Processing

Text/Reference:

1. Daniel Jurafsky and James H. Martin, "Speech and Language Processing" Prentice Hall; 1 st edition (2000)
2. James Allen. *Natural Language Understanding.* The Benajmins/Cummings Publishing Company Inc. 1994
3. Tom Mitchell. *Machine Learning.* McGraw Hill, 1997
4. Robert W. Sebesta; Concepts of Programming Language; Pearson Education.

MCA 306 A03 : THEORY OF COMPUTATION

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

UNIT-1

Introduction of automata, computability, and complexity; mathematical notations and terminology; finding proofs and types of proofs.

Automata and Languages: Regular languages, finite automata, formal definition of a finite automaton, formal definition of computation, designing finite automata.

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UNIT-II

Non-deterministic finite automata: Equivalence of NFAs and DFAs, closure under the regular operations, Regular Expressions: formal definition of a regular expression, equivalence with finite automata, nonregular languages: pumping lemma for regular languages.

UNIT-III

Push down Automata and Context free languages: Context free grammars, designing context free grammar, ambiguity in CFG and its removal, Chomsky normal form push down automata: formal definition, graphical notations, Languages accepted by PDA, Equivalence of PDA and CFG, Non-context free languages.

UNIT-IV

Turing Machines and Computability: Formal definition of turing machines with examples, graphical notations, variants of turing machines, church-turing thesis, Hilbert's problem.

Decidability, undecidability and reducibility: Decidable languages; decidable problems concerning regular languages and context free languages, the halting problem, undecidable problems, mapping reducibility, decidability of logical theories, turing reducibility.

Text/Reference Books :

1. Michael Sipser, "Introduction to the Theory of Computation", Second Edition, 2007, CENGAGE learning India Pvt. Ltd., New Delhi.
2. John E. Hopcroft, Rajeev Motwani & Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", Third Edition, 2007, Pearson Education Inc., New Delhi.

MCA 406 A04 : DIGITAL IMAGE PROCESSING

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

UNIT-I

Introduction: Origins of digital image processing, application area, components of an image processing system.

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Digital Image Fundamentals: Elements of visual perception, light and the electromagnetic spectrum, image sensing and acquisition, image sampling and quantization, relationships between pixels.

UNIT-11

Image Enhancement in the Spatial Domain: Background, gray level transformations, histogram processing, enhancement using arithmetic/logic operations, spatial filtering, smoothing spatial filters, sharpening spatial filters, combining spatial enhancement methods.

Image Enhancement in the Frequency domain: Introduction to the Fourier transform and the frequency domain, smoothing frequency-domain filters, sharpening frequency domain filters, homomorphic filtering, implementation.

UNIT-111

Image restoration: Model of the image degradation/restoration process, noise models, restoration in the presence of noise only–spatial filtering, periodic noise reduction by frequency domain filtering, linear, position-invariant degradations, estimating the degradation function, inverse filtering, minimum mean square error (Wiener) filtering, constrained least squares filtering.

UNIT-1V

Color image processing: Color fundamentals, and models, color image processing, transformations, smoothing and sharpening, color segmentation.

Image compression: Image compression models, error-free compression, lossy compression, image compression standards.
Edge detection – Thresholding; Region Based segmentation; Boundary representation: chair codes, Polygonal approximation, Boundary segments, boundary descriptors.

Text/Reference Books:

1. Rafael C. Gonzalez and Richard E. Woods. Digital Image Processing, Pearson Education 2003.
2. Ralf Steinmetz, Klara nahrsteddt; Multimedia, Pearson Education.
3. William K Pratt, Digital Image Processing John Willey (2001)
4. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy .
5. A.K. Jain, PHI, New Delhi -Fundamentals of Digital Image Processing.
6. Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India,2000.

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MCA 311 Programming in Java Lab

Practical Lab : 6 Hours per Week (4 Credits)
Examination : Practical Examination – 4 Hours Max. Marks- 100

Lab Exercises based on Theory Paper MCA 301

MCA 312 Linux OS and Shell Programming Lab

Practical Lab : 6 Hours per Week (4 Credits)
Examination : Practical Examination – 4 Hours Max. Marks- 100

Lab Exercises based on Theory Paper MCA 303

MCA 313 .NET Lab

Practical Lab : 6 Hours per Week (4 Credits)
Examination : Practical Examination – 4 Hours Max. Marks- 100

Lab Exercises based on Theory Paper MCA 304

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Course Content in Detail- MCA IV Semester (2012-2013)

Note : 1. Papers I to V are compulsory and paper VI is elective core course. Elective core course will be chosen out of four Elective Core Courses.

2. Internal assessment will be done by teacher concerned on the basis of test papers, regularity in the class and performance of the candidate. Maximum marks in internal assessment of each paper is 100.

MCA 401: COMPUTER BASED OPTIMIZATION TECHNIQUES

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100
Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.

2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

UNIT- I

Linear Programming Problems (LPP): Formulation of an LPP, Solution of an LPP using graphic method and simplex method, Slack, Surplus & Artificial variables, Two-phase and big-M method.

Special cases in LPP: Alternate optimum solution, An unbounded solution, Infeasible Solution, Duality in LPP, Revised Simplex method.

UNIT- II

Transportation Problems: Definition, methods for finding initial basic feasible solutions - North West corner rule, least cost cell entry method, Vogel's approximation method, methods for finding optimal solution - MODI Method,.

Assignment problems: Definition & concept, solution of an assignment problem for optimum solution - Hungarian Method.

Sequencing : Job - problems for processing N Jobs on 2 machines, processing N jobs on 3 machines, processing N jobs on processing M machines, Processing 2 jobs on M machines (Graphic Method).

UNIT- III

Inventory Models: What is Inventory? Types of Inventories, Inventory Decisions, Cost involved in inventory problems, Controlled & Uncontrolled variables, deterministic inventory control system, concept of an average inventories, concept of economic order quantity (EOQ). (In short Model-I, II and Model III).

Replacement Models: Introduction - The replacement problem, replacement of items that deteriorate (With money value), replacement of items that fail completely (Mortality theorem).

UNIT - IV

Project Management by PERT & CPM: Introduction - Historical Development of CPM/PERT, Application of PERT - CPM techniques, network diagram representation, rules for drawing network, time estimation & critical path in network analysis.

Queuing theory: Introduction queuing system, queuing problem, transient & steady states, traffic intensity, distribution of queuing system (Birth & Death Process), Queuing Models - I, II & III.

RECOMMENDED BOOKS:

1. Gillette B.E.: Introduction to Operations Research - A Computer Oriented Algorithmic approach, Tata McGraw Hill Pub. Co., New Delhi.
2. Taha Hatndy: A Operation Research - An Introduction, Fifth Edn. PHI, New Delhi.
3. Metal K.V. & Mohan C.: Optimization Methods in Operations Research and systems Analysis, 3rd Edn., New age International Publishers, New Delhi.
4. Hiller, F.S. & Limerman, G.L.: Introduction to Operations Research, 2nd Edn. Holden day inc., London, 1974.
5. Sharma S.D. Operations Research, Kedar Nat R. & Com., Meerut, 2003.
6. Kapoor V.K.: Operations Research, Sultan Chand & Sons, 1999.
7. P. K Gupta & D.S Hira : Operation Research, S. Chand & Company Ltd, New Delhi 2000

MCA 402 Advanced Java Programming & Technology

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100
Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit I

Introduction to Advance Java Application: Networking with Java - Networking basics, Socket, port, Proxy servers, Internet addressing and URL, java.net –networking classes and interfaces, Implementing TCP/IP based Server and Client. Classes to be covered Socket, Server-Socket, IP Address, URL connections.

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Java Applets: Introduction, Applet Architecture ; The java.applet.Applet Class; The Five Stages of an Applet's Life Cycle, Methods for Adding UI Components, Methods for Drawing and Event Handling.

Unit –II

Applications in distributed environment: Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI – IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models - JAR file creation.

Database Application : The JDBC Connectivity Model, Database Programming, Connecting to the Database Types of JDBC Drivers, Writing JDBC applications using select, insert, delete, update; Types of Statement objects (Statement, Prepared-Statement and Callable-Statement); ResultSet, ResultsetMetaData; Inserting and updating records, Connection Pooling.

Unit III

Introduction to J2EE : J2EE Overview, Need of J2EE; J2EE Architecture, J2EE APIs, J2EE Containers. Overview of J2ME and its Features- Building MIDlets, User Interface, Event Handling, Screens, List and Forms. **J2ME** – Overview, MIDlets, Create User Interface, Event Handling with Command Tickers, Screen, Text Box, List and Forms.

Servlet :Web Application Basics, Architecture and challenges of Web Application, Servlet life cycle, Developing and Deploying Servlets ,Exploring Deployment Descriptor (web.xml), Handling Request and Response, Initializing a Servlet, Accessing Database, Servlet Chaining, Session Tracking & Management, Dealing with cookies, Transferring Request, Accessing Web Context, Passing INIT and CONTEXT Parameter, Sharing information using scope object, Controlling concurrent access, User Authentication, Filtering Request and Response- Programming Filter, Filter Mapping, Servlet Listeners.

Java Server Pages Technology: Basic JSP Architecture , Life Cycle of JSP (Translation, Compilation), JSP Tags and Expressions , Role of JSP in MVC-2, JSP with Database, JSP Implicit Objects, Tag Libraries, JSP Expression Language (EL), Using Custom Tag. JSP Capabilities - Exception Handling, Session Management, Directives, JSP with Java Bean.

Unit –IV

Java Beans : Introduction to Java Bean, Rules for writing a Simple Bean, Java Naming Directory Interface API ,Java Naming Directory Interface concept.

Enterprise JAVA Beans : Enterprise Bean overview, Types of enterprise beans, Advantages of enterprise beans, The Life Cycles of Enterprise Beans, Working with Session Beans, Statefull vs. Stateless Session Beans, Working with Entity Beans, Message Driven Beans.

Introduction to Struts : (A Web Application Framework) – Struts-config.xml; Understanding MVC architecture; ActionServlet, ActionForm, ActionMapping, Action classes.

Reference/Text Books :

1. Cay S Horstmann and Gary Cornell, "Core Java 2, Volume I - Fundamentals", Pearson Education, USA, 2005.

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2. Cay S Horstmann and Gary Cornell, "Core Java 2, Volume II - Advanced Features", Pearson Education, USA, 2005.
3. Nicholas C Zakas, Jeremy McPeak and Joe Fawcett, "Professional Ajax", Wrox, USA, 2006.
4. Steve Holzner, "Inside XML", Techmedia, New Delhi, 2001.
5. Kathy Sierra and Bryan Basham, "Head First Servlets and JSP", Shroff Publishers and Distributors, Mumbai, 2007.
6. Marty Hall and Larry Brown, "Core Servlets and JavaServer Pages: volume 1: core technologies", Pearson Education, USA, 2008.
7. Marty Hall, "Core Servlets and JavaServer Pages: volume 2 Advanced technologies",Pearson Education,USA, 2008.
8. Steve Graham, Doug Davis, Simeon Simeonov, Glen Daniels, et.al, "Building Web Services with Java", Pearson Education, USA, 2004.
9. Enterprise JavaBeans (3rd Edition), O'Reilly' by Richard Monson-Haefel,
10. Developing Java Beans, O'Reilly Media By Robert Englander,

MCA 403 : Advanced Database systems

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit I

~~Overview of relational algebra and Structured Query Language (SQL).~~

Transaction Management and Concurrency Control : Transaction -Evaluating Transaction Results, Transaction Properties, Transaction Management with SQL, The Transaction Log ; Concurrency Controls; Concurrency Control with Locking Methods; Concurrency Control with Time Stamping Methods - Wait/Die and Wound/Wait Schemes , Concurrency Control with Optimistic Methods, Database Recovery Management.

Parallel database Systems: Concepts, Architecture of Parallel Databases, Inter-Query and Intra-Query Parallelism, Inter-Operational and Intra-Operational Parallelism, Design of Parallel Database Systems.

Unit II

Introduction to Object-Based Databases : Object Oriented Database concepts, Advantages, OODBMS Features, Groups and Languages; Object Relational Database concepts and Design.

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Database Performance Tuning and Query Optimization : Database Performance and Tuning; Statistics ; Query Processing; Indexes and Query Optimization ; Optimizer Choices: SQL Performance Tuning.

PL/SQL : Concepts of Embedded SQL, Dynamic SQL, SQLJ. PL/SQL Concepts, Elements, Structures, Cursors, Triggers, Database Stored Procedures and SQL/PSM.
~~XML : XML Hierarchical Data Model, XML Document and Databases, XML Queries~~.

Unit III

Distributed Database Management Systems : Evolution, Characteristics, DDBMS Components; Levels of Data and Process Distribution(i.e. SPSD, MPSD, MPMD); Distributed Database Transparency Features; DDBMS Design- Data Fragmentation, Data Replication, Data Allocation; Client/Server vs. .DDBMS.

Introductions to Data Warehousing and Data Mining : Data Warehouse – Decision Support Architectural Styles; Twelve Rules that Define a Data Warehouse; Data Mining Concepts. OLAP – Concepts, Architecture relation, OLAP V/s OLTP, Star V/s Clouding Architecture.

Unit IV

Database Connectivity and Web Technologies : Database Connectivity - Native SQL Connectivity, ODBC, DAO, and RDO, OLE-DB, ADO.NET, Java Database Connectivity (JDBC); Internet Databases - Web-to-Database Middleware: Server-Side Extensions, Web Server Interfaces, The Web Browser, Client-Side Extensions, Web Application Servers.

Database Administration and Security : The Need for and Role of a Database in an Organization; The Evolution of the Database Administration Function; The Database Environment's Human Component- The DBA's Managerial Role, The DBA's Technical Role; Security - Security Policies, Security Vulnerabilities, Database Security; Database Administration Tools - The Data Dictionary; Developing a Data Administration Strategy.

Text/ Reference Books :

1. Prescribed: Hoffer, J.A., Prescott, M. &Topi, H. (2008) Modern database management. (9 th ed.) .NJ: Prentice Hall.
2. Silberschatz A, Korath H., Sudarshan S. ; Database System Concepts; McGraw Hill.
3. Recommended: Date, C. J. (2003) An introduction to database systems. (8 th ed.). NJ: Addison Wesley.
4. Shah, N. (2004) Database systems using oracle. (2nded.). NJ: Prentice Hall.
5. Elmasri R., Navathe S.B; Fundamentals of Database Systems; Pearson Edu.
6. Singh S.K ; Database Systems; Pearson Education.
7. Leaon A. Leaon M; Database Management System; Leaon Press.
8. Thomas M. Colnnolly, Begg C.E.; Database Systems; Pearson.

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MCA 404 : MANAGEMENT INFORMATION SYSTEM

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit I

Introduction to MIS: Meaning and Role of MIS, Definition of MIS, System Approach to MIS. MIS Organization within a company. Concept of Balanced MIS, effectiveness and efficiency criteria.

MIS Planning: MIS structure and components, MIS features, Problem and Derivation of MIS plans, Prioration and developmental strategies.

Unit II

Conceptual Design of MIS : Definition of problem, System objectives and system constraints. Analysis of information source, alternative system design and selection optimal system.

Detailed System Design and Implementation: Application of basic design concepts to MIS. Involvement of end- user and role of MIS department and System Analyst, Role of Top Management during design and implementation.

Unit III

System Evaluation : System evaluation review and update. Management and control of MIS function. Advanced MIS concept, Pitfalls in MIS development.

Decision Making System : Decision Making Definition and Concept, Phases of Decision Making Process, Modeling Process, Static and Dynamic Models, Sensitive Analysis, Heuristic Programming, Simulation.

Unit IV

Decision Support System : DSS Definition, Characteristics, Application, Case Study. Expert System : Concept, Structure, Application and Case Study.

Application of MIS(see note at end): MIS for Accounting and Finance Function, MIS for Personnel Systems, For Marketing Systems, Inventory system, DSS, EMS, Decision Support System, Enterprise Management Systems.

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Note: A Standard layout **is to be adopted for all MIS:**

(1) Key Information Needs.
(2) Transaction Processing and Management Control.
(3) Reports Design and Data Collection Methods routing, frequency, Input, Output and Control Reports.
(4) Computer System Design- Master and Transaction files, Checks & Control Reports.

Reference/Text Books :

1. Murdick R.G., Ross J E.& Claggett J.R., *"Information system for Modern Management"*, PHI.
2. James A.O Brien, *"Management Information Systems"* ,Galgotia Pubn.
3. Wigarders K, Svensson A., Sehong L, *"Structrured Analysis & Design of Inormation Systems"* , Mc-Graw Hill.
4. Locus, *"Analysis, Design and Implementation of Information system"*, 3rd Ed., McGraw-Hill
5. Jawadekar, *"Information Systemfor Management"*
6. Anderson Lavid L , Post Gerald V, *"Management Information System* ", Tata Mc-Graw Hill.
7. Efrain Turban; Decision Support & Intelligence System; 8th Edition; Pearson Education.

MCA 405 : E-Commerce

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100
Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit I

Basic Concepts : Introduction, Definition, Objectives, Advantages and disadvantages, Forces driving E-Commerce, Traditional commerce Vs. E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce.

Electronic Data Interchange : Concepts of EDI and Limitation, Application of EDI, Disadvantages of EDI, EDI model; EDI Implementation, MIME and Value-Added Network, Internet-based EDI.

Unit II

E-Commerce Models: B2C,B2B, C2C, C2B, other models – Brokerage Model, Aggregator Model, Info-mediary Model, Community Model and value chain Model, Advertise Model.

Electronic Payment Systems: Special features required in payment systems, Types of E-payment systems, E-Cash, E-cheque, credit card, Smart Card, Electronic Purses, e-Billing, E- e-Micropayments , Point Of Sales System(POS) - Meaning, Uses, Structure.

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Unit III

Customer Relationship Management & Technologies : E-Transition Challenges in Indian Corporates, E-Commerce and WWW, e- Marketing, E-Customer Relationship Management, E-CRM Problems and Solutions, CRM Capabilities and Customer life cycle, E-Supply Chain Management. E-Strategy- Planning the E-Commerce Project, E-Commerce Strategy and Knowledge Management, E-Business Stretegy and Data Warehousing & Mining. ERP for E-Commerce. Customer-effective Web Design – Requirement, Strategy and Model.

Unit IV

m-Commerce: Overview of mobile-Commerce, Mobile Delivery Technology & Switching Methods, Attributes of m-Commerce, Drivers of m-Commerce, m-Commerce Security issues, Mobile ATM(ICICI Bank Case Study). Applications of m-Commerce: Mobile Financial Applications, m-wallet, Mobile Shopping, Advertising And Content provision.
Case-Study

Security Issues in E-Commerce: Security risk of E-Commerce, Types of threats, Security tools and risk management approach. Cyber laws, Business Ethics, IT Acts.

Suggested Books:

(1) Bharat Bhaskar, Electronic Commerce – Frameroork Technologies and Applications, Tata McGraw Hill.

(2) Ravi Kalakota & A.B. Whinston, Frontiers of Electronic Commerce, Pearson Education.

(3) Ravi Kalakota & A.B. Whinston, Electronic Commerce A Manager's Guide, Pearson Education.

(4) Agarwala Kamlesh, N and Agarwala Deeksha, Business on the Net Introduction to the E-Com., Macmillan India.

(5) P. T. Joseph, E-Commerce: A Managerial Perspective, PHI, 2002.

MCA 406 B01 : Network Management

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100

Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit – I

Basic Concepts : Data Communications and Network Management Overview, Basic Foundations, Standards, Models, and Language of Network Management.

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Network Management Technologies : SGMP, CMIP, SNMP Network Implementation and Management Strategies, Review of Computer Network Technology, SNMP, Broadband, and TMN Management, Performance Management, Fault Management, Configuration Management, Security Managements, Accounting Managements. Network Management Configuration: Centralized Configuration, Distributed Configuration. Selected Management Strategy. SONET – introduction.

Unit – II

Management Information Base (MIB): Structure of Management Information, NMS Presentation of the SMI, NMS Meter-ware Network View. Remote Monitoring (RMON), RMON Group. Desktop Management: Desktop Management Interface(DMI), DMI Architecture, DMI Browser,DMI/SNMP Mapping, Desktop SNMP Extension Agents. Setting up LAN Access, SNMP Configuration.

SNMP Technology : SNMPvl Network Management - Organization and Information Models. SNMPvl Network Management- Communication and Functional Models. SNMPv2, SNMPv3, RMON SNMP Management.

Unit – III

Delivery and Routing of IP Packets: Routing Methods, Routing Module, Classless, Interior and Exterior Routing, Routing information protocol(RIP), Open shortest path first protocol (OSPF), BGP, GGP. Private Networks. Virtual Private Network (VPN), Network Address Translation.

Internet Control Message Protocols (ICMP): ICMP Package, Messaging, Transmission Operations and Protocols; Services.

Unit – IV

Management Tools, Systems, and Applications: Network Management Tools and Systems Network Management Applications, Web-Based Management .

Security Management : Secure Network Management and Network Security Management, Organizational Realities. Protocol Capabilities. Tool Capabilities. Secure Management Design Options. Network Security Management, Firewalls, Trusted systems, IT act and cyber laws.

1. Mani Subramanian, *"Network Management: Principles and Practice"*, Addison Wesley.

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MCA 406 B02 : Artificial Intelligence

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100
Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit : I

Basic Concept : Foundations of AI , scope, problems, and approaches of AI. Intelligent agents, reactive, deliberative, goal-driven, utility-driven, and learning agents ,Artificial Intelligence programming techniques

Problem-solving through Search: forward and backward, state-space, blind, heuristic, problem-reduction, A, A*, AO*, minimax, constraint propagation, neural, stochastic, and evolutionary search algorithms, sample applications.

Unit : II

Knowledge Representation and Reasoning: Ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications.

Planning: planning as search, partial order planning, construction and use of planning graphs

Unit : III

Representing and Reasoning with Uncertain Knowledge: probability, connection to logic, independence, Bayes rule, bayesian networks, probabilistic inference, sample applications.

Decision-Making: basics of utility theory, decision theory, sequential decision problems, elementary game theory, sample applications. Expert System- Need, Componets, Categories, Stages of Expert System Development.

Unit : IV

Machine Learning and Knowledge Acquisition: learning from memorization, examples, explanation, and exploration. learning nearest neighbor, naive Bayes, and decision tree classifiers, Q-learning for learning action policies, applications.

Brief Survey of selected additional topics: perception, communication, interaction, and action; multi-agent systems. Sample Applications of AI, student project presentations

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Reference/Text Books :

1. Artificial Intelligence: A Modern Approach, 3rd Edition, by Stuart Russell and Peter Norvig. , ISBN-13: 978-0-13-604259-4.
2. Artificial Intelligence, Rich & Knight, TMH
3. Introduction to AI & Expert Systems, Patterson, PHI
4. Neural Networks, Fuzzy Logic & Genetic Algorithms, Rajsekharan, PHI

MCA 406 B03 : Compiler Design

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100
Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit – I

Overview of Compilation : Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation – LEX lexical analyzer generator.

Unit – II

Parsing : Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Pre-processing steps required for predictive parsing. Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing , handling ambiguous grammar, YACC – automatic parser generator.

Unit – III

Symbol Tables : Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information. Block structures and non block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records

Unit – IV

Code optimization & Generation : Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation. Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation. Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

Recommended reference/text books:

1. Principles of compiler design -A.V. Aho . J.D.Ullman; Pearson Education.
2. Holub, Compiler Design in C, PHI.
3. Engineering a Compiler-Cooper & Linda, Elsevier.

MCA 406 B04 : Multimedia Systems

Theory & Tutorial : 4 hours per week (4 credits)
Examination : Theory Paper - 3 Hours ; Max. Marks- 100
Note : 1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit – I

Multimedia System Basics : Multimedia System Elements: Multimedia System Architecture; Multimedia technologies; Video/Audio Fundamentals. Multimedia Authoring and Tools Graphics and Image Data Representations, Color in Image and Video, Fundamental Concepts in Video, Basics of Digital Audio. Multimedia I/O Technologies-Key Technology Issues, Standard Multimedia Devices, Multimedia Output Devices.

Unit – II

Compression and Decompression : Type of Compressions, Binary Image Compression Schemes, Image Compression, Video Image Compression, Audio Compression, Lossless Compression Algorithms, Lossy Compression Algorithms, Image Compression Standards, Basic Video Compression Techniques, MPEG Video Coding I - MPEG-1 and 2, MPEG Video Coding II - MPEG-4, DVI and Beyond.

Unit – III

Audio Compression : Audio Compression Techniques, MIDI, MPEG Audio Compression, Speech Reorganization and Generation, Video Images and Animation.
File Formats and Standards – Rich Text, TIFF, RIFF, MIDI, JPEG, AVI, MPEG, TWAIN formats and its uses.

Multimedia Communication : Multimedia Communication and Retrieval, Multimedia Network Fundamentals, Multimedia Protocols for the Internet, Multimedia Network Communications and Applications, Multimedia Networking Services, Multimedia OS design and Implementation.

Unit – IV

Trends in Multimedia – Multimedia in Wireless Networks; Content-Based Retrieval in Digital Libraries; Multimedia Storage Systems, User Interface; Multimedia Synchronization, Multimedia Presentation and Web Technologies(Documents, Hypertext, MHEG), Multimedia Databases, P2P Multimedia Systems.

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Multimedia Applications : Media Preparation, Media Composition, Image Processing & Image Reorganization, Animation, Media Integration, Media Communication, Media Consumption; Education & Training, Media Entertainment and Full Motion Digital Video Applications

Reference/Text Books :

1. Prabhat K. Adrleigh, Kiran Thakrar; Multimedia System Design; PHI
2. Ralf Steinmetz, Klara Nahrstedt; Multimedia : Computing, Communication & Applications; Pearson Education;
3. Fundamentals of Multimedia, Ze-Nian Li, and Mark S. Drew, Pearson Prentice Hall, October 2003.
4. Multimedia Communication Systems, K. Rammohanarao, Z. S. Bolzkovic, D. A. Milanovic, 1st edition, Prentice Hall, May 2002.
5. Video Processing and Communications, Yao Wang, Joem Ostermann, and YaQin Zhang, Prentice Hall, 2002.
6. Web Caching and Replication, Michael Rabinovich and Oliver Spatscheck, Addison-Wesley, 2002.
7. Multimedia Communications: Applications, Networks, Protocols and Standards, Fred Halsall, Addison-Wesley, 2001.

MCA 411 Advanced Java Lab

Practical Lab : 6 Hours per Week (4 Credits)
Examination : Practical Examination – 4 Hours Max. Marks- 100

Lab Exercises based on Theory Paper MCA 402

MCA 412 Advanced DBMS Lab

Practical Lab : 6 Hours per Week (4 Credits)
Examination : Practical Examination – 4 Hours Max. Marks- 100

Lab Exercises based on Theory Paper MCA 403

MCA 423 Mini Project

Practical Lab : 6 Hours per Week (4 Credits)
Examination : Practical Examination – 4 Hours Max. Marks- 100

Technology : Use .NET /Java/Web Technology.

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