DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO. ACAD/NP/M.E./Syllabi/189/2013

It is hereby informed to all concerned that, on recommendations of the Faculty of Engineering and Technology, the Hon'ble Vice-Chancellor has accepted the following **"Revised Syllabi with Cumulative Grade Point Average [CGPA]"** under the Faculty of Engineering & Technology on behalf of the **Academic Council Under Section-14(7) of the Maharashtra Universities Act, 1994** as appended herewith :-

Sr. No.	Revised Syllabi
[1]	Revised Syllabus of M.E. [Computer Networking Engg.],
[2]	Revised Syllabus of M.E. [Structural Engineering],
[3]	Revised Syllabus of M.E. [Water Resources Engineering],
[4]	Revised Syllabus of M.E. [Environmental Engineering],
[5]	Revised Syllabus of M.E. [Software Engineering],
[6]	Revised Syllabus of M.E. [Computer Science],
[7]	Revised Syllabus of M.E. [Control System Engineering],
[8]	Revised Syllabus of M.E. [Heat Power],
[9]	Revised Syllabus of M.E. [Manufacturing Engineering],
[10]	Revised Syllabus of M.E. [Electronics],
[11]	Revised Syllabus of M.E. [Electronics & Telecommunication],
[12]	Revised Syllabus of M.E. [Embedded System],
[13]	Revised Syllabus of M.E. [Communication Engineering],
[14]	Revised Syllabus of M.E. [Digital Communication],
[15]	Revised Syllabus of M.E. [Biotechnology],
[16]	Revised Syllabus of M.E. [CAD/CAM],
[17]	Revised Syllabus of M.E. [Thermal],
[18]	Revised Syllabus of M.E. [Design Engineering],

This is effective from the Academic Year 2013-2014 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO. ACAD/ NP/ M.E./
SYLLABI / 2013/14092-100
V.C.14[7] A-08.
Date:- 15-06-2013.

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Director,
Board of College and
University Development.

Copy forwarded with compliments to :-

1] The Principals, affiliated concerned Colleges,
Dr. Babasaheb Ambedkar Marathwada University.

2] The Director, University Network & Information Centre, UNIC, with **a request to upload the above all syllabi on University Website [www.bamu.net].**

Copy to :-

1] The Controller of Examinations,
2] The Superintendent, [Engineering Unit],
3] The Programmer [Computer Unit-1] Examinations,
4] The Programmer [Computer Unit-2] Examinations,
5] The Superintendent, [Eligibility Unit] ,
6] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,
Dr. Babasaheb Ambedkar Marathwada University,
7] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

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DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

Revised Syllabus of

M.E. (COMPUTER NETWORKING ENGINEERING)

[Effective from July-2013 - 2014]

Dr. Babasaheb Ambedkar Marathwada University Aurangabad.

Faculty of Engineering & Technology

Rules and Regulations for M.E. & M.Tech. Courses

- **What is a credit system**

  A credit system is a systematic way of describing an educational program by attaching credits to its components. The definition of credits in higher education systems may be based on different parameters, such as student workload, learning outcomes and contact hours.

- **Advantages of the Credit System**
  - Represents a much-required shift in focus from teacher-centric to learner-centric education since the work load estimated is based on the investment of time in learning, not in teaching.
  - Helps to record course work and to document learner work load realistically since all activities are taken into account-not only the time learners spend in lectures or seminars but also the time they need for individual learning and the preparation of examinations etc.
  - Segments learning experience into calibrated units, which can be accumulated in order to gain and academic award.
  - Helps self-paced learning. Learners may undertake as many credits as they can cope with without having to repeat all the courses in a given semester if they fail in one or more courses. Alternatively, they can choose other courses and continue their studies.

- **What is Grading?**

  The word Grade derived from the Latin word gradus, meaning, step. Grading, in the educational context is a method of reporting the result of a learner's performance subsequent to his evaluation. It involves a set of alphabets which are clearly defined and designated and uniformly understood by all the stake holders. A properly introduced grading system not only provides for a comparison of the learner's performance but it

also indicate the quality of performance with respect to the amount of efforts put in and the amount of knowledge acquired at the end of the courses by the learners.

➢ CURRICULUM:

1.1 Curriculum:

Every program with specialization has a prescribed course structure which in general terms is known as Curriculum. It prescribes course to be studied in each semester; the relevant information containing course structure along with detail syllabus for each course of each program is updated periodically and is uploaded on the website.

1.2 Semesters:

The Faculty of Engineering & Technology implements a credit based curriculum and grade based evolution system for P.G. program is of four semesters. The academic courses are delivered in the first two semesters. Dissertation work is carried out by a student in the third and fourth semester. The first semester begins in the last week of July ends by the last week of November while the second semester begins in the first week of January and ends by the second week of May. Total duration for each semester is generally of 20 weeks including the period of examination, evaluation and grade declaration.

1.3 Course Credit:

Education is organized around the semester-based credit system of study. The prominent features of the credit system are a process of continuous evaluation of a student's performance/progress and flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grades obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the program. Also a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree. All programmers are defined by the total credit requirement and a pattern of credit distribution over courses of different categories.

1.4 Course credits assignment

Each courses, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and laboratory contact hours in a week. This weightage is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours.

Lectures and Tutorials: One lecture or tutorial hour per week per semester is assigned one credit.

Practical/Laboratory: One laboratory hour per week per semester is assigned one credit.

Example: Course: XYZ Engg: 4 credits (3-1-2)

The credits indicated for this course are computed as follows:

3 hours/week lectures = 3 credits

1 hours/week tutorial = 1 credit

2 hours/week practical = 2 x 0.5 = 1 credit

2 hours/week seminar = 2 x 0.5 = 1 credit

Dissertation seminar = 2 x 1= 2 credit

(3-1-2) 3 credit course = (3 h Lectures + 1 h Tutorial + 2 h Practical) per week

= 6 Contact hours per week

1.5 Earning Credits

At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average.

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

1.6 Evaluation System

1. Semester Grade Point Average (SGPA) =

   SUM (course credits in passed courses X earned grade points)

   SUM (Course credits in registered courses)

2. Cumulative Grade Point Average (CGPA) =

   SUM (course credits in passed courses X earned grade points) of all Semester
   ---
   SUM (Course credits in registered courses) of all Semester

3. At the end of M.E & M. Tech Program, student will be placed in any one of the divisions as detailed below.(According to AICTE Handbooks)

   I[st] Division with distinction : CGPA ≥ 8.25 and above

   I[st] Division : CGPA ≥ 6.75 and < 8.25

   II[nd] Division : CGPA ≥ 6.75 and < 6.25

As per AICTE Handbook (2013-14), new gradation suggested as follows,

Table 1

Grade Point	Equivalent Range
6.25	55%
6.75	60%
7.25	65%
7.75	70%
8.25	75%

Conversion of CGPA to percentage marks for CGPA ≥ 5.0 can be obtained using equations.

Percentage marks = (CGPA X10) – 7.5

An example of these calculations is given below:

Typically one example for academic performance calculations of semester -I

Table 2

Course No. (1)	Course Credit (2)	Grade Awards (3)	Earned Credit (4)	Grade Points (5)	Points Secured (6)=(4) x (5)
Subject 1	4	B	4	6	24
Subject 2	4	C	4	5	20
Subject 3	4	O	4	10	40
Subject 4	4	A+	4	8	32
Subject 5	4	C	4	5	20
Seminar	2	A++	2	9	18
Total	22		22	38	134

1. Semester Grade Point Average (SGPA) = $\frac{(134)}{(22)} = 6.09$

2. Cumulative Grade Point Average (CGPA) =
   Cumulative points earned in all passed courses = 134 (past semester) + 134 (this sem.) = 268

   Cumulative earned credits = 22 (past semesters) +22 (this sem) = 44

   $\frac{\sum (134 + 134)}{\sum (22 + 22)} = 6.09$

System Evaluation Table

Table 3

Grade	Grade Points	Marks Obtained (%)			Description Performance
		Regular Semester	Re-Examination	Summer Semester Examination/Re-appear	
O	10	91-100	--	--	Outstanding
A++	09	86-90	91-100	91-100	Excellent
A+	08	76-85	86-90	81-90	Very Good
A	07	66-75	76-85	71-80	Good
B	06	56-65	66-75	61-70	Fair
C	05	46-55	56-65	51-60	Average
D	04	40-45	40-55	40-50	Poor
F	00	Below 40	Below 40	Below 40	Fail
EE					Incomplete
WW					Withdrawal
XX	--	--	--	--	Detained
ABSENT	--	--	--	--	Absent
PP	--	--	--	--	Passed (Audit Course)
NP	--	--	--	--	Not Passed (Audit Course)

Grade Awards:

i) A ten point rating scale shall be used for the evaluation of the performance of the student to provide letter grade for each course and overall grade for the Master's Programme. Grade points are based on the total number of marks obtained by him/her in all the heads of examination of the course. These grade points and their equivalent range of marks are shown separately in Table-4.

Table 4: Ten point grades and grade description

Sr.No.	Equivalent Percentage	Grade Points	Grade	Grade Description
1	90.00 – 100	10	O	Outstanding
2	80.00 – 89.99	9	A++	Excellent
3	70.00 – 79.99	8	A+	Exceptional
4	60.00 – 69.99	7	A	Very Good
5	55.00 – 59.99	6	B+	Good
6	50.00 – 54.99	55	B	Fair
7	45.00 – 49.99	5	C+	Average
8	40.01 – 44.99	4.5	C	Below Average
9	40	4.00	D	Pass
10	<40	0.00	F	Fail

ii) Non appearance in any examination/assessment shall be treated as the student have secured zero mark in that subject examination/assessment.

iii) Minimum D grade (4.00 grade points) shall be the limit to clear/pass the course/subject. A student with F grade will be considered as 'failed' in the concerned course and he/she has to clear the course by reappearing in the next successive semester examinations. There will be no revaluation or recounting under this system.

iv) Every student shall be awarded Grade points out of maximum 10 points in each subject (based on 10 Point Scale). Based on the Grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) shall be computed. Results will be announced at the end of each semester and cumulative Grade card with CGPA will be given on completion of the course.

Proposed Coding System of M.E/M.Tech Subjects

Six Digit Code for a subject (PG Course)

	Digits→	1 2 3	4	5 6
Sr. No.	**Branch ↓**	**Branch code**	**Year**	**Subject**
1	Electronics	MEX	PG I year – 6	**Semester –I/III**
2	Communication Engineering	MEC	PG II Year - 7	1-20 Theory
3	Electronics & Telecom.	MET		21-30 Practical
4	Digital Communications	MDC		31 Dissertation-I
5	Embedded System	MES		41-49 Electives
6	Structure Engineering	MSE		**Semester –II/IV**
7	Environmental Engineering	MEV		51-70 Theory
8	Water Resource Engineering	MWR		71-80 Practical
9	Computer Engineering	MCE		81 Dissertation-II
10	Computer Network	MCN		91-99 Electives
11	Software Engineering	MSW		
12	Mechanical Engineering	MME		
13	Thermal Engineering	MTE		
14	CAD/CAM	MCC		
15	Manufacturing	MMF		
16	Heat Power	MHP		
17	Machine Design	MMD		
18	M.Tech Mechanical	MTM		
19	CSE & IT	MCI		
20	Manufacturing Processing Engineering	MMP		

Note: - Kindly, Allot Same Code for same Electives/ subjects for different branches to avoid repetitions of Question papers/settings/assessments.

DEGREE OF MASTAR OF ENGINEERING
(Course with effective from academic year: 2013-2014)

I	1	The examination for the Degree of Master of Engineering will be held in four semesters, M.E. Semester-I, M.E. Semester-II, M.E. Semester-III, and M.E. Semester-IV in case of full time course.
II	**Rules & Eligibility**	
	1	Rule for admission to P.G. Degree course in Engineering and Technology as per rules and regulation of AICTE/DTE & Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
III	**Evaluation method**	
	1	Each theory course will be of 100 marks and be divided in to internal examination of 20 marks and semester examination of 80 marks (20+80=100 marks). Each practical course will be of 50 marks
	2	There shall be two class tests within a semester. First based on 40% syllabus taught and second based on 60% syllabus taught. The setting of question paper and assessment will be done by the concerned teacher who has taught the syllabus. Average marks obtained out of two examinations will be considered for the preparation of final sectional marks/ grade.
	3	The Question papers in theory subjects shall be set by the Examiners appointed for the purpose by the University on the recommendations of the Board of studies of the concerned PG Course.
	4	The assessment of the term work for any subject will be done by recognized post-graduate teacher.
	5	To pass the examination a candidate must obtain a minimum CGPA of 6.25 (CGPA to the scale of 10).
	6	Candidate who secures CGPA $\geq$ 6.25 and CGPA < 6.75 declared to have passed examination in second class.
	7	Candidate who secures CGPA $\geq$ 6.75 and CGPA < 8.25 declared to have passed examination in first class.
	8	Candidate who secures CGPA $\geq$ 8.25 declared to have passed examination in first class with distinction.

IV	1	In case candidate fails to get D grade in one or more heads of passing examination, he will be allowed at his option, to reappear for only those heads of passing in which he has failed or got less than D grade at subsequent examinations.
	2	The grades obtained by the candidate in any head of passing at the examination will be carried forward unless the candidates reappear for the head of passing in accordance with ref. IV (1)
	3	In case the candidate passes in all heads of passing under M.E. Semester-I, M.E. Semester-II examination and obtained a minimum CGPA of 6.25 in M.E. Semester-I, M.E. Semester-II taken together as required under ref. II(2) above, he will not be allowed to reappear for any head of passing under M.E. Semester-I, M.E. Semester-II in accordance with ref. IV(1)
	4	A candidate will not be allowed to appear for M.E. Semester-III examination unless he passes in all heads of passing under M.E. Semester-I, M.E. Semester-II examination and obtains a minimum CGPA of 6.25 in M.E. Semester-I, M.E. Semester-II taken together under reference II(2).
	5	Whenever a candidate reappears for M.E. Semester-III and M.E. Semester-IV examinations he will have to resubmit the dissertation with suitable modification and must also reappear for oral examination on it.
	6	A candidate registered for M.E. Examination must clear his examination within five years from the date of registration.
V	**Attendance Requirement**	
	1	Each semester of the course shall be treated as a separate unit for calculation of the attendance
	2	A candidate shall be considered to have satisfied the attendance requirement if he/she has attended not less 75% of the class in each subject of all the semesters (Theory, Laboratory, Semester Practical training and Dissertation work) actually conducted up to the end of the semester.
	3	A Candidate, who does not satisfy the attendance required, mentioned as above, shall not be eligible to appear for the Examination of that semester and shall be required to repeat that semester along with regular students later.
	4	The Principal of the concerned College shall display regularly, the list of such candidates who fall short of attendance, on the Notice Boards.

	5	The list of the candidates falling short of attendance shall be sent to the University at least one week prior to the commencement of theory/practical examination, whichever is earlier.
VI		The following are the syllabi in the various subjects of the examination for the Degree of Master of Engineering.

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Faculty of Engineering And Technology
Tentative Structure for ME (COMPUTER NETWORKING AND ENGINEERING)

Sub	Semester - I	Contact Hrs/Week				Examination Scheme (Marks)						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Duration of Theory Examination	Credit
Part – I												
1	Advanced Digital Communication.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
2	Advanced Operating System.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
3	Advanced Computer Networks.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
4	UNIX Network Programming.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
5	Elective – I.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
6	Network Simulation Lab.	-	-	4	4	-	-	50	-	50	-	2
7	UNP Lab.	-	-	2	2	-	-	-	50	50	-	1
8	Seminar.	-		2	2	-	-	-	50	50	-	1
	Total of Part – I	15	5	8	28	100	400	50	100	650		24

L: Lecture hours per week **T:** Tutorial Hours per week **P:** Practical hours per week
CT: Class Test **TH:** University Theory Examination **TW:** Termwork
P: Practical / Oral Examination

Elective – I

1. Advanced Problem Solving.
2. Grid Computing.
3. Network Processor.

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Faculty of Engineering And Technology

Tentative Structure for ME (COMPUTER NETWORKING AND ENGINEERING)

Sub	Semester – II	Contact Hrs/Week				Examination Scheme (Marks)						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Duration of Theory Examination	Credit
Part – II												
1	Distributed Database.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
2	Information and Network Security.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
3	Network Routing Algorithm.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
4	Soft Computing.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
5	Elective – II.	3	1	-	4	20	80	-	-	100	3 Hrs.	4
6	Soft Computing Lab.	-	-	4	4	-	-	50	-	50	-	2
7	Security Lab.	-	-	2	2	-	-	-	50	50	-	1
8	Mini Project.	-	-	2	2	-	-	-	50	50	-	1
Total of Part – II		15	5	8	28	100	400	50	100	650		24

L: Lecture hours per week **T:** Tutorial Hours per week **P:** Practical hours per week
CT: Class Test **TH:** University Theory Examination **TW:** Termwork
P: Practical / Oral Examination

Elective – II

1. Discrete-Event System Simulation.
2. Storage Area Network.
3. Graph Theory.

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Faculty of Engineering And Technology
Tentative Structure for ME (COMPUTER NETWORKING AND ENGINEERING)

Sub	Semester – III	Contact Hrs/Week				Examination Scheme (Marks)						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Duration of Theory Examination	Credit
Part – III												
1	Dissertation (Part - I)	-	-	12	12	-	-	-	50	50	-	12
Total of Part – III				12	12				50	50		12

Sub	Semester – IV	Contact Hrs/Week				Examination Scheme (Marks)						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Duration of Theory Examination	Credit
Part – IV												
1	Dissertation (Part - II)	-	-	20	20	-	-	50	200	250	-	20
Total of Part – IV				20	20			50	200	250		20

L: Lecture hours per week **T:** Tutorial Hours per week **P:** Practical hours per week
CT: Class Test **TH:** University Theory Examination **TW:** Termwork
P: Practical / Oral Examination

Total:- SEM-I + SEM-II + SEM-III + SEM-IV
= 24 + 24 + 12 + 20
+ SEM-IV
= 80

Total Contact Hours
SEM-I + SEM-II + SEM-III

= 28 + 28 + 12 + 20 = 88

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SEMESTER - I

CN101 - ADVANCED DIGITAL COMMUNICATION

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **DIGITAL TRANSMISSION FUNDAMENTALS** **(8 HRS)**

   Digital Representation of Information, Why Digital Communications. Digital Representation of Analog Signals: Elements of Digital Communication and Characterization of Communication Channels, Fundamental Limits on Digital Transmission, Line Coding; Modems and Digital Modulation Properties of Media and Digital Transmission Systems: Error Detection and Correction: Two Dimensional Parity Checks, Internet Checksum, Polynomial Codes, Standardized Polynomial Codes, Error Detecting Capability of a Polynomial Code.

2. **WAVE FORM CODING TECHNIQUE** **(8 HRS)**

   Pulse code modulation, Channel. Noise and error probability, Differential pulse code modulation, Delta modulation, coding speech at low bit rates, Applications.

3. **BASE BAND SHAPING FOR DATA TRANSMISSION** **(8 HRS)**

   Discrete PAM signals, Inter-symbol interference (ISI), Nyquist criterion for distortion-less Baseband binary transmission, correlative coding, Eypattern, transmission, correlative coding, Eye-patterns Based and M-ary PAM system, Adoptive Equalization. The zero forcing algorithms, The LMA algorithm.

4. **DIGITAL MODULATION TECHNIQUE** **(8 HRS)**

   Digital Modulation Formats, Coherent Binary modulation techniques, Coherent quadrature Modulation technique, No coherent binary modulation technique comparison of binary and quadrature modulation technique , M-ary Modulation technique, Power spectra, bandwidth efficiency, M-ary modulation formats viewed in the lights of the channel capacity, effect of inter symbol interference, Bit verses symbol Error Probability.

REFERENCES:

1. Alberto Leon – Garcia and IndraWidjaja: "*Communication Networks -Fundamental Concepts and Key architectures*", 2nd edition Tata McGraw-Hill, 2000.
2. Simon Haykin: "*Digital Communication*", 4th Edition, John Wiley and Sons, 2000
3. John G Proakis: "*Digital Communications*", 3rd Edition, McGraw Hill,2006
4. Leon W Couch: "*Analog / Digital Communication*", 5th Edition, PHI,2007

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CN102 - ADVANCED OPERATING SYSTEM

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **OPERATING SYSTEM** **(8 HRS)**

   Introduction - Operating systems – CPU Scheduling approaches – Process synchronization Semaphores – Deadlocks – Handling deadlocks.

2. **DISTRIBUTED SYSTEMS** **(8 HRS)**

   Introduction - Advantages of distributed system over centralized system, Limitations of Distributed system; Design issues

3. **COMMUMNICATION IN DISTRIBUTED SYSTEM** **(8 HRS)**

   Communication in Distributed systems – ATM, Client-Server model, Distributed operating system – Communication primitives – Message Passing Model, Remote Procedure Call

4. **SYNCHRONIZATION IN DISTRIBUTED SYSTEMS** **(8 HRS)**

   Clock synchronization–Lamport's logical clock, Mutual exclusion – Non token based and token based algorithm; atomic transactions; Distributed deadlock detection and prevention

5. **DISTRIBUTED RESOURCE MANAGEMENT** **(8 HRS)**

   Distributed Shared Memory (DSM) – Memory coherence, Page based DSM, Shared variable DSM, Object based DSM;

TEXT BOOKS:

1. Andrew S. Tanenbaum, "*Distributed Operating Systems*", Pearson Education Asia, 1995.
2. Silberschatz, Galvin, "*Operating System Concepts*", John Wiley, 2003.
3. Stallings, "*Operating System*", PHI, New Delhi, 2004

REFERENCES:

1. Mukesh singhal and Niranjan G. Shivarathri, "*Advanced Concepts in Operating Systems*", Tata McGraw Hill, 1994..
2. W.Richard Stevens (PHI) - "*UNIX Network Programming*" – 1998

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CN103 - ADVANCED COMPUTER NETWORKS

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme
Theory Paper - 80 Marks
Class Test - 20 Marks

1. REVIEW (8 HRS)

Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet - Foundation of Networking Protocols: 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM - Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

2. THE LINK LAYER AND LOCAL AREA NETWORKS (8 HRS)

Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Virtualization - Routing and Internetworking: Network–Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer

3. LOGICAL ADDRESSING (8 HRS)

IPv4 Addresses, IPv6 Addresses - Internet Protocol: Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intradomain Multicast Protocols, Interdomain Multicast Protocols, Node-Level Multicast algorithms - Transport and End-to-End Protocols: Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control – Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server

4. WIRELESS NETWORKS AND MOBILE IP (8 HRS)

Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking

Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch

5. **VPNS, TUNNELING AND OVERLAY NETWORKS (8 HRS)**

Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – VoIP and Multimedia Networking: Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol - Wireless Sensor Networks: Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

TEXT BOOKS:

1. Nader. F. Mir, "*Computer and communication Network*", Pearson Education 2007.
2. James F. Kurose, Keith W.Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet*", Third Edition, Pearson Education, 2007.
3. A. Farrel, Elsevier, "*The Internet and Its Protocols*".

REFERENCES:

1. Andrew S. Tanenbaum, "*Computer Networks*", Fourth Edition, Prentice Hall.
2. Greg Tomsho,Ed Tittel, David Johnson, "*Guide to Networking Essentials*", Fifth Edition, Thomson.
3. S. Keshav, "*An Engineering Approach to Computer*"
4. Behrouz A. Forouzan, "*Networking, Data Communication and Networking*", Fourth Edition, Tata McGraw Hill,2007.

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CN104 - UNIX NETWORK PROGRAMMING

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. INTRODUCTION (8 HRS)

OSI model, Processes, simplified model, client server model, history of Unix Networking.

Introduction to UNIX file system: Vi editor, File handling utilities, security by file permissions, process utilities, disk utilities, Networking commands, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, umask, ulimit, ps, who, w, finger, arp, telnet, rlogin.

2. UTILITY COMMANDS (8 HRS)

Text processing utilities and backup utilities detailed commands to be covered are: cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, more, pg, comm., cmp, diff, tr, awk, tar, cpio. What is a shell, shell responsibilities, pipes and input redirection, Output redirection and here documents, the shell as programming Language shell Variables, conditions, history and control structures and shell programming.

Communication Protocols: Introduction, TCP/IP, XNS, UUCP.

3. INTER-PROCESS (8 HRS)

Pipe, process pipes, the pipe call, parent-child process, named Pipes: FIFOs), Semaphores, message queues and shared memory applications of IPC.

Application Protocols: Application protocols with example implementation SMTP, HTTP, FTP.

4. REMOTE COMMAND EXECUTION (8 HRS)

Introduction, Security issues, rcmd function and rshd server, rexec function and rexecd server.

Remote Login: Introduction, Terminal line disciplines, pseudo terminal, terminal modes, control terminals rlogin overview, rlogin client, rlogin server.

5. SOCKETS (8 HRS)

Introduction, Unix domain protocols, socket addresses, elementary socket system calls, advanced socket system calls, reserved ports, stream pipes, passing file descriptions, socket options, asynchronous I/O, Input/output Multiplexing, Out-of-Band data, sockets and signals, Internet super servers, socket implementation.

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TFTP Protocol: Introduction, protocol, security, data formats, connections, client user interface, UDP implementation, TCP implementation.

TEXT BOOKS:

1. W. Richard Stevens, "*UNIX Network Programming*", PHI, 2001.
2. Sumitabha Das, "*UNIX Concept and Application*", Tata McGraw-Hill, 2nd Edition.

REFERENCES:

1. Stephan Prata, "*Advanced Unix Programming Guide*", BPB Publication.

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CN105 – EL-I ADVANCED PROBLEM SOLVING

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial-01 Hrs.

Examination Scheme
Theory Paper - 80 Marks
Class Test - 20 Marks

1. BASIC CONCEPTS (REVIEW) (8 HRS)

Abstract Data Types, Data structures, Algorithms- Characteristics Of Algorithms, Performance analysis- Time complexity and Space complexity, Asymptotic Analysis-Big O, Omega and Theta notations. ADT, Static and Dynamic Implementation of Linear Data Structures: Stack, Queue, Circular Queue, Stack ADT, Queue ADT, Non Linear data structures-Trees-Basic Terminology, Binary tree ADT, array and linked representations, Recursive traversals, threaded binary trees, Applications- Huffman coding,

2. SEARCH TREES (8 HRS)

Binary Search Tree ADT, Implementation, Operations- Searching, Insertion and Deletion, Balanced Search trees-AVL Trees, Operations – Insertion and Searching-Trees, B-Tree of order m,Operations- Insertion, Deletion and Searching, Introduction to Red-Black Trees, Splay Trees*-Trees, B+-Trees(Elementary treatment), Comparison of Search Trees. Linear Search, Binary Search, Hashing-Hash functions, Collision-Handling schemes, Dictionary ADT, Linear list representation, Skip list representation, Hash table representation, Comparison of Searching methods.

3. GRAPHS AND SORTING (8 HRS)

Basic Terminology, Graph Representations- Adjacency matrix, Adjacency lists, Adjacency multilists, Graph traversals- DFS and BFS, Spanning trees-Minimum cost spanning trees, Kruskal's Algorithm for Minimum cost Spanning trees, Shortest paths-Single Source Shortest Path Problem,All Pairs Shortest Path Problem. Sorting- Bubble Sort, Insertion Sort, Shell sort, HeapSort, RadixSort, Quicksort, Merge sort, Comparison of Sorting methods.

4. UNIT IV (8 HRS)

Greedy Method: Knapsack problem, Tree vertex splitting, Job sequencing with deadlines, optimal storage on tapes.

Dynamic Programming: Multistage graph, Optimal Binary Search Tree, String editing, 0/1 Knapsack problem, Reliability design, Traveling salesperson problem Backtracking: 8-queens problem, sum of subset, graph coloring. Lower Bound Theory: Comparison Trees, techniques for algebraic problems.

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5. UNIT V **(8 HRS)**

NP-Hard & NP-Complete Problems: Basic concept, Cook's Theorem, NP-Hard graph problems, NP-Hard Scheduling problems, NP-Hard code generation problems.

PRAM Algorithms: Computational Model, Fundamental techniques & algorithms, Selection, Merging, Sorting Lower bounds.Mesh Algorithms: Computational Model, Packet routing, Fundamental algorithms, Merging, Sorting.

TEXT BOOKS:

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, "*Data Structures using C & And C++*", Pearson Pub.
2. Yeshwant Kanetkar,"*Data structures through C*", BPB Pub.
3. Rober L. Kruse, "*Data Structures and Program Design*", PHI Pub.
4. Ellis Horowitz, Sartaj Sahni and Sanguthewar Rajsekaran, "*Fundamentals of Computer Algorithms*", Galgotia Pub.

REFERENCES:

1. Thomas H. Cormen, Charles S. Leiserson, Ronald, L. Rivest and Clifforf Stein, "*Introduction to Algorithm*", PHI Pub (2nd Edition).
2. Robert Lafore, "*Data structures and Algorithms in Java*", Pearson Education.
3. W.H.Ford and W.R.Topp, "*Data structures with Java*", Pearson Education.

Draft Copy

CN105 - EL-I GRID COMPUTING

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **CONCEPTS AND ARCHITECTURE** **(8 HRS)**

   Introduction to grid computing, who will use the grid? Virtual organization and the grid – Technical challenges in sharing relationship, Evolution of grid Technology, Grid architecture, grid application-Schedulers, Resource Broker, Load Balancing, Grid Portals, Integrated Solutions. Grid Infrastructure-Security, Resource Management, Information Services, Data Management.

2. **OPEN GRID SERVICE ARCHITECTURE** **(8 HRS)**

   Service oriented architecture, service oriented grid architecture, web service, open grid service infrastructure, OGSA Services and schema, case study.

3. **GRID MONITORING** **(8 HRS)**

   Introduction, Grid Monitoring Architecture (GMA), R-GMA. Different monitoring tools/framework. Discussion on the different monitoring systems.

4. **GRID SCHEDULING AND RESOURCE MANAGEMENT** **(8 HRS)**

   Introduction Scheduling paradigms, Resource Discovery, Resource selection, Schedule generation, Introduction to condor, SGE, PBS, LSF.

5. **DATA MANAGEMENT** **(8 HRS)**

   Data management categories and origins of structured data, Data management challenges Architectural Approaches Collective data Management Services. Federation services..

TEXT BOOKS:

1. Ian Foster, Carl Kesselman, "*The Grid 2: Blueprint for a New Computing Infrastructure*", Elsevier Series, 2004.
2. Joshy Joseph & Craig Fellenstein, "*Grid Computing*", Pearson/PHI PTR-2003.

REFERENCES

1. Vladimir Silva, "*Grid Computing for Developers*", Charles River Media, January 2006.
2. Fran Berman , Geoffrey Fox, Anthony J.G. Hey, "*Grid Computing: Making The Global Infrastructure a Reality*" ,Wiley, 2003

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3. Jarek Nabrzyski, Jennifer M. Schopf, Jan Weglarz, "*Grid Resource Management: State of the Art and Future Trends*", (International Series in Operations Research & Management Science), Springer; First edition, 2003

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CN105 - EL-1 NETWORK PROCESSOR

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **INTRODUCTION** **(8 HRS)**

   Traditional protocol processing Systems – Network processing Hardware – Basic Packet Processing Algorithms and data Structures - Packet processing functions – Protocol Software – Hardware Architectures for Protocol processing – Classification and Forwarding – Switching Fabrics.

2. **NETWORK PROCESSOR TECHNOLOGY** **(8 HRS)**

   Network Processors: Motivation and purpose - Complexity of Network Processor Design – Network Processor Architectures architectural variety, architectural characteristics Peripheral Chips supporting Network Processors: Storage processors, Classification Processors, Search Engines, Switch Fabrics, Traffic Managers.

3. **COMMERCIAL NETWORK PROCESSORS** **(8 HRS)**

   Multi-Chip Pipeline, Augmented RISC processor, Embedded Processor plus Coprocessors, Pipelilne of Flomogeneous processors. Configurable Instruction set processors – Pipeline of Electrogeneous processors – Extensive and Diverse processors – Flexible RISC plus Coprocessors – Scalability issues – Design Tradeuffs and consequences.

4. **NETWORK PROCESSOR: ARCHITECTURE AND PROGRAMMING CASE STUDY** **(8 HRS)**

   Architecture: Intel Network Processor: Multiheaded Architecture Overview – Features – Embedded EISC processor - Packet Processor Hardware – Memory interfaces – System and Control Interface Components – Bus Interface. Programming Software Development Kit-IXP Instruction set – register formats – Micro Engine Programming – Intra thread and Inter-thread communication – thread synchronization – developing sample applications – control plane – ARM programming.

5. **IOS TECHNOLOGIES** **(8 HRS)**

   CISCO COS – Connectilvity and scalability – high availability – IP routing – IP services – IPV6 – Mobile IP – MPLS – IP Multicast 0 Manageability – QoS – Security – Switching – Layer VPN2.

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TEXT BOOKS:

1. Douglas E.Comer "*Networks Systems Design using Network Processors*", Prentice Hall JaN. 2003.
2. Panas C. Lekkas, "*Network Processors: Architectures, Protocols and Paradigms Telecom Engineering*", McGraw Hill, Professional, 2003.

REFERENCES:

1. Patrick Crowley, M. A. Eranklin, H. Hadminglu, PZ Onfryk, "*Network Processor Design, Issues and Practice*", Vol-1 Morgan Kaufman, 2002.
2. Patrick Crowley, M. A. Frankliln, H. Hadimioglyum PZ Onufryk, "*Network Processor Design, Issues and Practice*", Vol-II, Morgan Kaufman, 2003.
3. www.cisco.com

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CN106 – NETWORK SIMULATION LAB.

Teaching Scheme:
Practical - 4 Hrs/Week

Examination Scheme:
Termwork - 50 Marks

It shall consist of a minimum of 8 experiments based on the syllabus of Advanced Computer Networks.

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CN107 – UNP LAB.

Teaching Scheme:
Practical - 2 Hrs/Week

Examination Scheme:
Practical - 50 Marks

It shall consist of a minimum of 8 experiments based on the syllabus of Unix Network Programming.

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CN108 - SEMINAR

Teaching Scheme:
Practical - 2 Hrs/Week.

Examination Scheme:
Practical - 50 Marks

The Seminar will consist of a typewritten report covering the topic selected for the seminar. The candidate shall deliver the seminar on the topic which will be judged by two examiners and the marks will be given accordingly.

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SEMESTER-II

CN201 - DISTRIBUTED DATABASES

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **UNIT I** **(8 HRS)**

   Features of Distributed versus Centralized Databases Principles of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases, Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Distributed Database Design

2. **UNIT II** **(8 HRS)**

   Translation of Global Queries to Fragment Queries Equivalence transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries,

3. **UNIT III** **(8 HRS)**

   Optimization of Access Strategies, A Framework for Query Optimization, Join Queries.The Management of Distributed Transactions A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions,

4. **UNIT IV** **(8 HRS)**

   Concurrency Control for Distributed Transactions Distributed Deadlocks,. Reliability, Basic Concepts, Non blocking Commitment Protocols, Reliability and concurrency Control

5. **UNIT V** **(8 HRS)**

   Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection.

TEXT BOOKS:

1. Stefano Ceri, Giuseppe Pelagatti,TMH, "*Distributed Databases Principles & Systems*".
2. M. Tamer Ozsu, Patrick Valduriez, "*Principles of Distributed Database Systems*", Pearson Education, 2nd Edition.

REFERENCES:

1. E.R.Harold, "*Java Network Programming*", 2nd edition, O'Reilly, SPD.
2. G.Coulouris, J.Dollimore and Tim Kindbirg, "*Distributed Systems, Concepts and Design*", 3rd edition, Pearson Education.

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CN202 - INFORMATION AND NETWORK SECURITY

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **INTRODUCTION TO INFORMATION SECURITY** **(8 HRS)**

   Introduction; What is security? Critical characteristics of information; NSTISSC security model; Approaches to information security implementation; Information security terminologies. Management Models; the Maintenance Model.

   Introduction to Network Security

   Attacks, Services, and Mechanisms; Security Attacks; Security Services; A model for Internetwork Security; Internet Standards and RFCs.

2. **SECURITY TECHNOLOGY** **(8 HRS)**

   Firewalls and VPNs: Introduction, Physical design, Firewalls, Protecting Remote Connections. Intrusion Detection, Access control and Other Security Tools: Honey Pots, Honey Nets, and Padded cell systems; Scanning and Analysis Tools; Access Control Devices. Intruders, Intrusion Detection Systems.

3. **CRYPTOGRAPHY** **(8 HRS)**

   Conventional Encryption Principles and Algorithms (DES, AES, RC4),; Cipher Block Modes of Operation; Location of encryption devices; Key distribution Public Key Cryptography Principles and Algorithms (RSA, RABIN, ELGAMAL, Diffie-Hellman, ECC), Key management. Approaches to message authentication; Secure Hash functions (SHA-512,WHIRLPOOL) and HMAC .

4. **AUTHENTICATION APPLICATIONS** **(8 HRS)**

   Digital Signatures: Comparison, Process- Need for Keys, Signing the Digest, Services, Attacks on Digital Signatures. Kerberos, X.509 Directory Authentication Service

   Electronic Mail Security

   Pretty Good Privacy (PGP), S/MIME

5. **IP SECURITY** **(8 HRS)**

   IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management

   Web Security

   Web security requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Network Management Security

Basic concepts of SNMP, SNMPv1 community facility, SNMPv3, Viruses and related threats, Virus Countermeasures.

TEXT BOOKS:

1. William Stallings: "*Network Security Essentials Applications and Standards*", Person Education, 2000.
2. Behrouz A. Forouzan: "*Cryptography and Network Security*", Tata McGraw-Hill, 2007.

REFERENCES:

1. Michael E. Whitman and Herbert J. Mattord: "*Principles of Information Security, 2nd Edition*", Thomson, 2005.
2. William Stallings, "*Cryptography and Network Security*", Fourth Edition, Pearson Education 2007.

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CN203 - NETWORK ROUTING ALGORITHMS

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **INTRODUCTION** **(8 HRS)**

   ISO OSI Layer Architecture, TCP/IP Layer Architecture, Functions of Network layer, General Classification of routing, Routing in telephone networks, Dynamic Non hierarchical Routing (DNHR), Trunk status map routing (TSMR), real-time network routing (RTNR), Distance vector routing, Link state routing, Hierarchical routing.

2. **INTERNET ROUTING** **(8 HRS)**

   Interior protocol : Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Bellman Ford Distance Vector Routing. Exterior Routing Protocols: Exterior Gateway Protocol (EGP) and Border Gateway Protocol (BGP). Multicast Routing: Pros and cons of Multicast and Multiple Unicast Routing, Distance Vector Multicast Routing Protocol (DVMRP), Multicast Open sortest Path First (MOSPF), MBONE, Core Based Tree Routing.

3. **ROUTING IN OPTICAL WDM NETWORKS** **(8 HRS)**

   Classification of RWA algorithms, RWA algorithms, Fairness and Admission Control, Distributed Control Protocols, Permanent Routing and Wavelength Requirements, Wavelength Rerouting- Benefits and Issues, Lightpath Migration, Rerouting Schemes, Algorithms- AG, MWPG.

4. **MOBILE - IP NETWORKS** **(8 HRS)**

   Macro-mobility Protocols, Micro-mobility protocol: Tunnel based : Hierarchical Mobile IP, Intra domain Mobility Management, Routing based: Cellular IP, Handoff Wireless Access Internet Infrastructure (HAWAII).

5. **MOBILE AD–HOC NETWORKS** **(8 HRS)**

   Internet-based mobile ad-hoc networking communication strategies, Routing algorithms – Proactive routing: destination sequenced Distance Vector Routing (DSDV), Reactive routing: Dynamic Source Routing (DSR), Ad hoc On-Demand Distance Vector Routing (AODV), Hybrid Routing: Zone Based Routing (ZRP).

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TEXT BOOKS:

1. William Stallings, "*High Speed Networks and Internets Performance and Quality of Service*", II nd Edition, Pearson Education Asia. Reprint India 2002.
2. S. Keshav, "*An Engineering Approach to Computer Networking*", Addison Wesley 1999.
3. C. Shiva Ram Murthy, Mohan Guruswamy, "*WDM Optical Networks: Concepts, Design, and Algorithms*", Prentice Hall PTR, 2002.
4. C.E Perkins, "*Ad Hoc Networking*", Addison – Wesley, 2001.

REFERENCES:

1. M. Steen Strub, "*Routing in Communication Network*", Prentice –Hall International, Newyork,1995.
2. William Stallings, "*High speed Networks TCP/IP and ATM Design Principles*", Prentice-Hall, New York, 1995.

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CN204 - SOFT COMPUTING

Teaching Scheme
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **EVOLUTIONARY COMPUTING** **(8 HRS)**

   What is Soft computing? Necessity of Soft computing, Major Areas of Soft Computing, Applications.

   Basic Concepts of Genetic Algorithms (GA), Working Principle, Encoding methods, Fitness function, GA Operators- Reproduction; Crossover; Mutation, Convergence of GA, Multi-level Optimization, Real Life Problems.

2. **FUZZY SYSTEMS** **(8 HRS)**

   Fuzzy Set theory, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification, Fuzzy Logic, Fuzzy Rule based systems,

3. **NEURAL NETWORK**

   Basic Concept of Neural Network, Overview of Learning rules and activation functions, Single layer Perceptrons and Learning, Back Propagation networks- Architecture of Backpropagation(BP) Networks; Backpropagation Learning; Variation of Standard Backpropagation Neural Network,

4. **HYBRID SYSTEMS** **(8 HRS)**

   Sequential Hybrid Systems, Auxiliarty Hybrid Systems, Embedded Hybrid Systems, Neuro- Fuzzy Hybrid Systems, Neuro-Genetic Hybrid Systems, Fuzzy-Genetic Hybrid Systems.

   Genetic Algorithm (GA) based Back propagation Networks, GA based weight determination, Fitness function, Reproduction, Convergence,

5. **FUZZY LOGIC BASED NEURAL NETWORK MODELS** **(8 HRS)**

   Fuzzy Backpropagation (BP) Networks, Fuzzy Neurons Fuzzy BP architecture, Learning in Fuzzy BP, Inference by Fuzzy BP, Fuzzy ARTMAP, Fuzzy Associative Memories.

TEXT BOOKS:

1. S. Rajasekaran, G. A. Vijayalakshami, "*Neural. Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications*", PHI.

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REFERENCES:

1. Teng Lin, C. S. George Lee Chin, "*Neuro-Fuzzy Systems*", PHI.
2. Tomthy Ross, "*Fuzzy Logic and Engineering Application*", TMH.
3. Kishan Mehrotra, "*Elements of Artificial Neural Network*".
4. E. Goldberg, "*Genetic Algorithms: Search and Optimization*".

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CN205 - EL2 DISCRETE-EVENT SYSTEM SIMULATION

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. INTRODUCTION (8 HRS)

When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study.

Simulation examples: Simulation of queuing systems; Simulation of inventory systems; other examples of simulation.

2. GENERAL PRINCIPLES, SIMULATION SOFTWARE (8 HRS)

Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling; List processing. Simulation in Java; Simulation in GPSS.

STATISTICAL MODELS IN SIMULATION

Review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions; Poisson process; Empirical distributions.

3. QUEUING MODELS, RANDOM-NUMBER, RANDOM-VARIANT GENERATION (8 HRS)

QUEUING MODEL: Characteristics of queuing systems; Queuing notation; Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues.

Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers.

Random-Variant Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties

4. ANALYSIS OF SIMULATION DATA (8 HRS)

Input Modeling : Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; selecting input models without data; Multivariate and Time-Series input models.

Variance reduction. Verification and Validation, Optimization

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Variance reduction techniques; Model building, verification and validation; Verification of simulation models; Calibration and validation of models. Optimization via Simulation,

OUTPUT ANALYSIS FOR A SINGLE MODEL

Types of simulations with respect to output analysis; Stochastic nature of output data; Measures of performance and their estimation; Output analysis for terminating simulations; Output analysis for steady-state simulations.

5. **APPLICATION, SIMULATION OF COMPUTER SYSTEM AND COMPUTER NETWORK** **(8HRS)**

Case studies of the simulation of manufacturing and material-Handling Systems, Simulation of computer Systems: Introduction, simulation Tools, Model Input, high level computer-system simulation, CPU simulation, Memory simulation, Simulation of Computer Networks: Introduction, Traffic Modeling, Media Access control, Data Link Layer, TCP, Model construction.

TEXT BOOKS:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: "*Discrete-Event System Simulation*", 4th Edition, Pearson Education, 2007.

REFERENCES:

1. Lawrence M. Leemis, Stephen K. Park: "*Discrete – Event Simulation: A First Course*", Pearson / Prentice-Hall, 2006.
2. Averill M. "*Law: Simulation Modeling and Analysis*", 4th Edition", Tata McGraw-Hill, 2007.
3. Ian F. Akyildiz, Jiang Xie and Shantidev Mohanty, "*A Survey of mobility Management in Next generation All IP- Based Wireless Systems*", IEEE Wireless Communications Aug.2004, pp 16-27.

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CN205 - EL2 STORAGE AREA NETWORKS

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **UNIT I** **(8 HRS)**

   Introduction – Storage and networking concepts – SCSI bus architecture – Networking in front of the server – Networking behind the server – Network -attached Storage – Fibre channel internals – Layers – Data encoding – Framing protocol – class of service – flow control – Name and addressing conventions.

2. **UNIT II** **(8 HRS)**

   SAN topologies – Point-to Point – Arbitrated Loop – Loop Addressing-Loop Initialization-Port Login-Loop port state machine – Design considerations for Arbitrated Loop – Fabrics – Fabric login – Simple Name Server – State Change Notification – Private Loop Support – Fabric Zoning – Building Extended SANs.

3. **UNIT III** **(8 HRS)**

   Fibre Channel Products – Gigabit Interface Converters (GBICs) – host Bus Adapters – Fibre channel RAID – Fibre channel JBODs – Arbitrated Loop Hubs – hub Architecture – Unmanaged Hubs – Managed Hubs – Switching Hubs – Fabric Switches – Fibre Channel-to-SCSI Bridges – SAN software Products – Problem isolation in SANs – Isolation Techniques – Fibre channel Analyzers.

4. **UNIT IV** **(8 HRS)**

   Management Studies – Storage Network Management – In-Band management – Out-of-Band Management-SNMP-HTTP-TELNET – Storage Network Management Issues – Storage Resource Management – Storage Management – Storage, Systems, and Enterprise Management Integration.

5. **UNIT V** **(8 HRS)**

   Application Studies – Full-motion video – LAN free and Server free Tape Backup – server clustering – Internet Service Providers – Campus storage networks – Disaster recovery. Fiber Channel futures – Bandwidth – Fiber channel over Wide Area Networking – Coexistence within Enterprise Networks – Total SAN solutions.

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TEXT BOOKS:

1. Tom Clark, "*Designing Storage Area Networks*", Addison-Wesley Professional, 1st edition, 1999.
2. Alex Goldman, "*Storage Area Networks Fundamentals*", Cisco Press 2002.

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CN205 - EL2 GRAPH THEORY

Teaching Scheme:
Lecture - 03 Hrs.
Tutorial - 01 Hrs.

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks

1. **INTRODUCTION** **(8 HRS)**
   Introduction Of Graphs, Paths, Cycles, And Trails, Vertex Degrees And Counting - Directed Graphs - Trees and Distance: Basic Properties. Spanning Trees and Enumeration, Optimization and Trees.

2. **MATCHING CONNECTIVITY AND FLOW** **(8 HRS)**
   Matching and Covers Algorithms and Applications. Matching in General Graphs. - Connectivity and Paths: Cuts and Connectivity, k-connected graphs - Network Flow Problems.

3. **COLOURING** **(8 HRS)**
   Vertex Colourings and Upper Bounds - Structure of k-chromatic Graphs, Enumerative Aspects.

4. **PLANAR GRAPHS, EDGES AND CYCLES** **(8 HRS)**
   Planar Graphs - Embeddings and Euler's Formula - Characterization of Planar graphs - Parameters of Planarity, Line Graphs and Edge-Colouring, Hamiltonian Cycles, Planarity, Colouring and Cycles.

5. **RAMSEY THEORY AND RANDOM GRAPHS** **(8 HRS)**
   Ramsey Theory for Graphs: Ramsey's Theorems - Ramsey numbers -Induced Ramsey theorems - Ramsey Properties and Connectivity. Random Graphs: The notion of a random graph - The Probabilistic method - Properties of almost all graphs - Threshold functions and second moments

REFERNCES:

1. R J Wilson "*Introduction to Graph Theory*", 4th Edition,Pearson Education 2003.
2. Reinhard Diestel "*Graph Theory*" ,, 2nd Edition, Springer- Verlog 2000,
3. Jay Yellen, Jonathan L.Gross "*Graph Theory and Its Applications*", CRC Press LLC 1998.
4. Bela Bollobas "*Modern Graph Theory*", Springer Verlag, July 1998.
5. Wilson "*Introduction to Graph Theory*", 2nd edition, Pearson Education India

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CN206 – SOFT COMPUTING LAB.

Teaching Scheme:
Practical - 4 Hrs/Week

Examination Scheme:
Termwork - 50 Marks

It shall consist of a minimum of 8 experiments based on the syllabus of Soft Computing.

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CN207 – SECURITY LAB.

Teaching Scheme:	Examination Scheme:
Practical - 2 Hrs/Week	Practical - 50 Marks

It shall consist of a minimum of 8 experiments based on the syllabus of Information and Network Security.

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CN208 - MINI PROJECT

Teaching Scheme	Examination Scheme:
Practical - 2 Hrs/Week.	Practical - 50 Marks

The student will have to make a literature survey and should select a small project (as suggested by faculty adviser) relevant to Computer Networking Engineering. The candidate should submit a comprehensive report on the work done and should deliver a seminar at the end of the semester which will be judged by two examiners and the marks will be given accordingly.

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SEMESTER-III

CN301 - DISSERTATION (PART - I)

Teaching Scheme
Practical - 12 Hrs/Week.

Examination Scheme:
Practical - 50 Marks

The dissertation Seminar will consist of a type written report covering the topic selected for Dissertation report. This should include the literature survey, technical details and related data required for the dissertation. The candidate shall deliver the dissertation seminar on the topic which will be judged by two examiners (one external and one internal guide) and the marks will be given accordingly.

SEMESTER-IV

CN401 - DISSERTATION (PART - II)

Teaching Scheme
Practical - 20 Hrs/Week.

Examination Scheme:
Termwork - 50 Marks
Practical - 200 Marks

The practical Examination will consist of a presentation along with the demonstration of the dissertation work. The said examination will be conducted by a panel of two examiners (one internal guide and one external examiner).