

Roll No. ....

Total Pages : 02

**BT-4/M-20**

**34001**

**COMPUTER ARCHITECTURE AND  
ORGANIZATION  
CSE-202-E**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *Five* questions in all. Q. No. **1** is compulsory.  
Attempt *four* more questions selecting *one* question  
from each Unit.

1. (a) Explain multilevel viewpoint of a computer system. **5**
- (b) Explain the structure of hard disk with suitable diagram. Also, explain seek time, latency time, transfer time and access time. **10**
- (c) Why is cache memory organized into hierarchy ? Explain the roles of each level. **5**
2. (a) What is GPR based CPU organization ? Draw the diagram of a GPR based CPU and explain its working. **10**
- (b) What is instruction cycle ? Explain 5-stage instruction cycle with the help of flow chart. **10**

**(2)L-34001**

3. (a) Explain indirect, PC relative and register indirect addressing modes with suitable memory diagrams. Also, explain their suitability. **10**
- (b) Explain different instruction formats of 8086 microprocessor. **10**
4. (a) What is memory hierarchy ? Explain various attributes of memory hierarchy. **10**
- (b) What is Microsequencer ? Design a simple microsequencer. **10**
5. (a) What is associative mapping ? Explain it using an example. **10**
- (b) What is Segmentation ? Explain conversion of logical address into physical address using segmentation. **10**
6. (a) Explain throughput, efficiency, speedup, MFLOPS and Amdahl's law. **10**
- (b) What is ILP ? Distinguish between scalar and superscalar pipeline. **10**
7. (a) What is Microinstruction ? Distinguish between horizontal and vertical microinstruction formats. **10**
- (b) What is Interrupt ? Explain different types of interrupt structures. **10**
8. (a) Explain optimal, LRU and LFU page replacement policies. Which one is best and why ? **10**
- (b) Compare the architectures of 80836 and 80486 processors. **10**

Roll No. ....

Total Pages : 02

**BT-4/M-20**

**34002**

**PROGRAMMING LANGUAGE**

**CSE-204-E**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit.

**Unit I**

1. (a) Explain data objects, variable and constant in detail.  
(b) Explain compiler and interpreter and its working.

**20**

2. What do you mean by syntax and semantic ? Write its structure with example.

**20**

**Unit II**

3. What is structured data objects and also write the step to implement structured data types ?

**20**

4. What is type definition and also explain overloaded subprogram and generic subprogram ?

**20**

**(2)L-34002**

**1**

### **Unit III**

5. What do you mean by synchronization and semaphore ?  
Also explain message passing. **20**
6. (a) What is Local Data and Shared Data ? Explain  
their referencing environment with example. **12**  
(b) What are different parameter transmission  
techniques ? **8**

### **Unit IV**

7. What do you mean by storage management and also  
explain system controlled storage management ? **20**
8. Explain the following terms : **20**  
(a) Procedural language  
(b) Object oriented language.

**BT-4/M-20: 34066**  
**MAT-204E: Computational Techniques**

Time: 3 hrs]

[Max. Marks: 100

Serial No. of Questions	There are 9 questions in all. Candidates are required to attempt 5 questions selecting at least one from each Part. All question carry equal marks.											
<b>PART-A</b>												
<b>1</b>	(a) ) Prove that $u_1x + u_2x^2 + u_3x^3 + \dots = \frac{x}{1-x}u_1 + \left(\frac{x}{1-x}\right)^2 \Delta u_1 + \left(\frac{x}{1-x}\right)^3 \Delta^2 u_1 + \dots$											
	(b) Estimate the length of the arc of the curve $3y = x^3$ from (0, 0) to (1, 3) using Simpson's $\frac{1}{3}rd$ rule taking 8 sub-intervals.											
<b>2</b>	(a) Derive the Newton's divided difference formula..											
	(b) Find the missing values in the following table: <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 0 10px;">x:</td> <td style="padding: 0 10px;">45</td> <td style="padding: 0 10px;">50</td> <td style="padding: 0 10px;">55</td> <td style="padding: 0 10px;">60</td> <td style="padding: 0 10px;">65</td> </tr> <tr> <td style="padding: 0 10px;">y:</td> <td style="padding: 0 10px;">3.0</td> <td style="padding: 0 10px;">--</td> <td style="padding: 0 10px;">2.0</td> <td style="padding: 0 10px;">--</td> <td style="padding: 0 10px;">- 2.4</td> </tr> </table>	x:	45	50	55	60	65	y:	3.0	--	2.0	--
x:	45	50	55	60	65							
y:	3.0	--	2.0	--	- 2.4							
<b>PART-B</b>												
<b>3</b>	(a) Solve the difference equation, $y_{m+3} + 16y_{m-1} = 0$ .											
	(b) Solve the equation $y_{n+2} - 3y_{n+1} + 2y_n = n^2 + 2n - 1$											
<b>4</b>	(a) Using-Gauss Elimination Method, find the inverse of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$											
	(b) Using Doolittle Method, find the inverse of the matrix $\begin{bmatrix} 2 & -2 & 4 \\ 2 & 3 & 2 \\ -1 & 1 & -1 \end{bmatrix}$											
<b>PART-C</b>												
<b>5</b>	(a) Explain Regula Falsi method with its Pit false and condition of convergence. Also, find its order of convergence.											

	(b) Using <i>Newton-Raphson method</i> , compute the real root of the equation $x = \sqrt{28}$ correct up to four decimal places.																				
6	(a) Solve the following equations by Relaxation Method: $4x - 4y + 3z = -8$ , $3x + 9y - 2z = 11$ , $4x + 2y + 13z = 24$ .																				
	(b) Use Gauss- Seidel Method to solve the following set of equations $28x + 4y - z = 32$ , $x + 3y + 10z = 24$ , $2x + 17y + 4z = 35$ .																				
<b>PART-D</b>																					
7	(a) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ , with initial condition $y=1$ at $x=0$ ; find $y$ for $x=0.1$ by Euler's method.																				
	(b) Derive predictor- corrector formula for Adam Bashforth method.																				
8	(a) Fit a second degree parabola to the following data: <table style="margin-left: 40px; border: none;"> <tr> <td>x:</td> <td>1.0</td> <td>1.5</td> <td>2.0</td> <td>2.5</td> <td>3.0</td> <td>3.5</td> <td>4.0</td> <td>y:</td> <td>1.1</td> </tr> <tr> <td></td> <td>1.3</td> <td>1.6</td> <td>2.0</td> <td>2.7</td> <td>3.4</td> <td>4.1</td> <td></td> <td></td> <td></td> </tr> </table>	x:	1.0	1.5	2.0	2.5	3.0	3.5	4.0	y:	1.1		1.3	1.6	2.0	2.7	3.4	4.1			
	x:	1.0	1.5	2.0	2.5	3.0	3.5	4.0	y:	1.1											
	1.3	1.6	2.0	2.7	3.4	4.1															
	(b) Using principle of least squares, find a and b such that $y = x/(a + bx)$ is the best fitting curve to the following data: <table style="margin-left: 40px; border: none;"> <tr> <td>x:</td> <td>3</td> <td>5</td> <td>8</td> <td>12</td> <td>15</td> </tr> <tr> <td>y:</td> <td>7.148</td> <td>10.231</td> <td>13.509</td> <td>16.434</td> <td>17.992</td> </tr> </table>	x:	3	5	8	12	15	y:	7.148	10.231	13.509	16.434	17.992								
x:	3	5	8	12	15																
y:	7.148	10.231	13.509	16.434	17.992																

Roll No. ....

Total Pages : 03

**BT-4/M-20**

**34092**

**OBJECT ORIENTED PROGRAMMING**

**CSE-202N**

Time : Three Hours]

[Maximum Marks : 75

**Note** : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

**Unit I**

1. (a) Describe the following characteristics of object oriented programming :
  - (i) Polymorphism
  - (ii) Data abstraction
  - (iii) Data encapsulation. **9**
- (b) What is a Class ? How is it created ? Explain using suitable example. **6**
2. (a) Differentiate between public, private and protected access specifiers. **6**
- (b) Define an enumerated data type in C++ with suitable example. **4**
- (c) State the difference between class and structure. Explain with an example. **5**

**(3)L-34092**

**1**

## Unit II

3. (a) Explain the difference between inline function and friend function with the help of an example. **8**
- (b) Differentiate between Default Constructor and constructor with Default argument. **7**
4. (a) Explain New operator with example. **3**
- (b) What does inheritance mean in C++ ? What are different forms of inheritance ? Give an example of each. **12**

## Unit III

5. (a) Explain static and dynamic binding with suitable example. **5**
- (b) Write a C++ program demonstrating use of the virtual function with the use of base and derived classes. **10**
6. (a) What is operator overloading ? What are the methods of overloading the operators in C++ ? Explain binary operator overloading in C++ with example. **12**
- (b) What is significance of Virtual Destructor ? **3**

#### Unit IV

7. (a) What are the different types of file opening modes ?  
Explain file attributes. **7**
- (b) What are class templates ? How are they created ?  
What is the need for class templates ? Explain with  
suitable example. **8**
8. (a) What is an exception ? List the principles of  
exception handling. Explain exception handling  
mechanism of C++ with suitable example. **12**
- (b) Explain stream manipulators. **3**

Roll No. ....

Total Pages : 02

**BT-4/M-20**

**34093**

INTERNET FUNDAMENTAL

CSE-204N

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

### Unit I

1. Write short notes on the following :
  - (a) Communication Software
  - (b) Internet Addressing
  - (c) IP.v6.
2. Define networks and also explain the history of internet and explain the Internet congestion.

### Unit II

3. What do you understand by FTP, HTTP and Gopher Commands ? Explain the techniques of FTP.

(2)L-34093

1

4. Write short notes on the following :
  - (a) Dictionary search engine
  - (b) Meta search engine.

### **Unit III**

5. Write short notes on the following :
  - (a) Message components and Message Composition
  - (b) Mailer Features and E-mail inner working.
6. Explain various concepts of scripting language. Also explain in detail server side programming in java script.

### **Unit IV**

7. Write short notes on the following :
  - (a) Introduce about web server PWS, Apache
  - (b) What is Web Security ? Explain it. Also explain various types of Attacks.
8. What is Cryptography ? Explain various encryption schemes and also discuss about Secure web documents.

Roll No. ....

Total Pages : 02

**BT-4/M-20**

**34094**

**DIGITAL DATA COMMUNICATION**

**CSE-206-N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

**Unit I**

1. What is the need of modulation ? Write a detailed note on amplitude, DSDSC and SSB modulation. **15**
2. Describe frequency and phase modulation. Draw a comparison between NBFM and WBFM. **15**

**Unit II**

3. (a) Explain QPSK encoding scheme. Mention the advantages of PSK technique over ASK and FSK schemes.
- (b) How DPCM does differ from PCM ? What is the sampling rate for PCM if the frequency ranges from 1000 to 4000 Hz ? **7+8=15**

**(2)L-34094**

4. (a) What are the principal types of modulation used in communication systems ? On what factors does the bandwidth requirement of a communication system depend ?
- (b) What are encoding schemes ? Write a detailed note on Manchester encoding and differential Manchester encoding. **7+8=15**

### **Unit III**

5. What are the different types of error detection technique ? Explain checksum and parity check technique with example. Generate the code word for ASCII character "K" = 1001011. Assume even parity for hamming code. **15**
6. (a) Draw a comparison among communication topologies using appropriate diagram.
- (b) Why standardization is required for serial interfaces ? Discuss RS-449/422 interface in detail. **7+8=15**

### **Unit IV**

7. Briefly explain multiplexing and inverse multiplexing. Explain FDM with proper diagram. Mention its advantages and disadvantages over TDM. **15**
8. Distinguish between the following :
- (a) FAMA and DAMA techniques
- (b) FH-SS and DS-SS techniques. **7+8=15**

Roll No. ....

Total Pages : 02

**BT-4/M-20**

**34095**

**MICROPROCESSOR AND INTERFACING  
CSE-208N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting *one* question from each Unit. All questions carry equal marks.

**Unit I**

1. With a neat and clean sketch explain the internal architecture of 8085 Microprocessor. **15**
2. Draw the pin configuration of 8085 Microprocessor and explain the function of all the pins in detail. **15**

**Unit II**

3. Describe data registers, address registers and index registers of 8086. **15**
4. Draw and explain the block diagram and pin diagram of 8086 microprocessor and discuss generation of CLK and reset signal using 8284. **15**

**(2)L-34095**

**1**

### **Unit III**

5. Describe 8086 addressing modes in detail with suitable examples. **15**
6. (a) Discuss the following assemble directives :  
(i) ASSUME  
(ii) SEGMENT. **6**
- (b) Write a programme to compute factorial for a number N between 1 and 8. **9**

### **Unit IV**

7. Discuss the function of DMA controller (8237) with suitable diagram. **15**
8. (a) Describe the operation, characteristics and interfacing of D/A covnertor with 8086 Microprocessor. **6**
- (b) Write short notes on the following :  
(i) Description and interfacing of 8251  
(ii) Interfacing of 8×8 Keyboard. **9**

Roll No. ....

Total Pages : 04

**BT-4/M-20**

**34096**

**OPERATING SYSTEMS**

**CSE-210N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

**Unit I**

1. (a) Justify the need of I/O structure and storage hierarchy in a computer system. **5**
- (b) Discuss the roles of using systems calls and system programs for the effective implementation of operating systems services modules. **5**
- (c) Why it is always beneficial to use various types of protection by the operating systems ? **5**
  
2. (a) Briefly discuss the following : **7.5**
  - (i) Real time computing
  - (ii) Batch Processing
- (b) What are the various system devices that are ordered by the operating systems ? Comment on the need of these system services. **7.5**

**(2)L-34096**

## Unit II

3. (a) Explain the following CPU scheduling algorithms :
- (i) SJF **2.5**
  - (ii) FCFS **2.5**
  - (iii) Round Robin. **2.5**
- (b) Write and explain the Dining Philosophers Problem. Also, provide the solution for the problem using semaphores. **7.5**
4. (a) Explicate the classical problem of synchronization. Discuss the role of hardware and software support which are involved in synchronization. **5**
- (b) How non-preemptive scheduling works? Briefly explain. **5**
- (c) Draw and explain the flow of process management activity that takes place during co-operating processes and inter process communication. **5**

## Unit III

5. (a) What is a page-fault ? List all the steps of how a page-fault is serviced by the operating system ? **7.5**
- (b) Define paging and fragmentation. The following is the sequence of page requests : 1, 2, 5, 3, 4, 3, 2, 5, 4, 2, 1, 1. Assume that there are three frames. Now, how many page faults will occur if MFU and LRU algorithms are used to replace pages ? **7.5**

6. (a) Explain the Dual-mode operation of an operating system. Explain contiguous memory allocation and linked allocation methods with the help of suitable working diagram. **8**
- (b) Explain and justify the roles of the following :
- (i) Paged segmentation **3.5**
- (ii) Recovery from deadlock **3.5**

#### Unit IV

7. (a) Draw the Gantt chart for the SSTF and FCFS scheduling policies and calculate the turnaround time, average turnaround time, waiting time, average waiting time, throughput and processor utilization for the following set of processes that arrive at a given arrival time shown in the table by applying SSTF and FCFS. **10**

Process	Arrival Time	Processing Time (Milliseconds)
P1	0	3
P2	1	5
P3	2	5
P4	3	5
P5	4	6
P6	5	4

- (b) Explain the Non-continuous (indexing and chaining) disk space management methods. **5**

8. (a) Explain the following security models :
- (i) Mandatory Access Control 2.5
  - (ii) Rule Based Access Control 2.5
  - (iii) Discretionary-Access Control 2.5
- (b) Justify the roles of the following with concern to the kernel I/O subsystem :
- (i) Scheduling 2.5
  - (ii) Caching 2.5
  - (iii) Spooling 2.5

Roll No. ....

Total Pages : 2

**BT-6/M-20**

**36001**

**MOBILE COMPUTING**

**Paper-CSE 302**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

**UNIT-I**

1. (a) Describe CDMA, TDMA and GSM. 10
- (b) Explain the term 'mobility management'. 10
2. (a) Explain Mobile IP and Cellular IP. 10
- (b) Write a short note on Co-channel interference. 10

**UNIT-II**

3. (a) Write a short note on broadcast disks. 10
- (b) Explain pull and push based data delivery models. 10
4. Explain Coda and other storage manager for mobility support. 20

**UNIT-III**

5. (a) Describe the ad-hoc network routing protocols. 10

- (b) Explain global state routing. 10
6. (a) What do you understand by dynamic source routing. 10
- (b) Explain ad-hoc on-demand routing. 10

#### **UNIT-IV**

7. (a) What do you understand by mobile transaction. Explain Kangaroo transactions. 10
- (b) Discuss team transaction. 10
8. Explain in detail the protocols for mobile commerce. 20
-

Roll No. ....

Total Pages : 2

**BT-6/M-20**

**36002**

**COMPUTER HARDWARE TECHNOLOGIES**

**Paper–CSE-304**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

**UNIT-I**

1. (a) What are the various types of memory modules? Explain their pros and cons. 10
- (b) Explain any *two* advanced memory technologies along with their working and their advantages over current memory technologies. 10
2. (a) Describe various functions and operations of power supply in a computer system. 10
- (b) Explain various types of UPS along with their working in brief. 10

**UNIT-II**

3. Explain the working of system chipset and various controllers on the motherboard on a computer system. 20

4. Write short notes on :
- (a) ROM POST.
  - (b) PCI.
  - (c) ISA.
  - (d) IRQ. 20

### UNIT-III

5. Explain IDE and SCSI interface along with their block diagram and working. Also compare them on basis of various counts. 20
6. What are various types of video adapters? Explain the working of video adapters. How can you troubleshoot a video adapter? 20

### UNIT-IV

7. (a) How can you troubleshoot a floppy disk and hard disk? Explain. 10
- (b) What are the various recordable devices? Explain in detail. 10
8. (a) Compare and contrast various types of printers. 10
- (b) Explain various types of keyboards along with their working and components. 10
-

Roll No. ....

Total Pages : 3

**BT-6/M-20**

**36003**

**NETWORK MANAGEMENT AND SECURITY**  
**Paper–CSE-306**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

**UNIT-I**

1. (a) Illustrate the differences between database of a network management system and its Management Information Base. How do you implement each in a network management system ?  
(b) What are the different type of digital signatures ? How is Digital Signature Standard approach different from RSA approach in finding digital signatures ?
2. (a) Define the following terms :
  - (i) Fabrication.
  - (ii) Avalanche Effect.
  - (iii) Poly-alphabetic Substitution.
  - (iv) Bucket Brigade Attack.
  - (v) Non-repudiation.  
(b) Why do some block cipher modes of operation only use encryption while other use both encryption and decryption. Also, explain how confusion and diffusion can be added to DES algorithm ?

## UNIT-II

3. (a) Describe the Chinese wall security policy. When does the race condition arise ? Also, what are the low-level protection mechanisms for operating system ?  
(b) Discuss program flaws that have security implications for Operating System. Also, explain the concept of Bell-La Padula access control model and list its limitations.
4. (a) What do you understand by Heisenbug and Bohr bug ? How are these different from each other ? Explain using suitable examples.  
(b) Differentiate between the following with appropriate examples :
  - (i) Biba and Clark-Wilson.
  - (ii) Discretionary and Mandatory Access Control.
  - (iii) Access Matrix and Access Control.

## UNIT-III

5. Define the following in brief :
  - (a) Chain of certificates and revocation of X.509 certificate.
  - (b) Kerberos realm.
  - (c) IPSEC.
6. (a) Explain in briefly the taxonomy of malicious programs.  
(b) Explain various classes of intruders.  
(c) What are the basic techniques of choosing passwords ?  
(d) Explain the architecture of distributed intrusion detection systems.

## UNIT-IV

7. Differentiate between Distributed Denial of Service attack and Denial of Service attack. Explain various types of mechanisms in which DDoS can be generated with suitable examples.
  8. List the design goals of different kinds of firewall. Also, discuss the techniques used by firewalls to control access and enforce security policies.
-

Roll No. ....

Total Pages : 2

**BT-6/M-20**

**36004**

**SOFTWARE ENGINEERING**  
**Paper–CSE-308**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit.

**UNIT-I**

1. (a) What is Software ? Explain various characteristics of a Software. 10
- (b) What are the major phases in waterfall model of software development ? Which phase consumes the maximum efforts for developing a typical software product ? 10
2. (a) What do you mean by project scheduling ? Explain the working of two project scheduling methods. 10
- (b) Explain Cocomo model in detail. 10

**UNIT-II**

3. (a) Define software configuration management. How configuration management helps the developers to manage change in evolving software systematically ? Explain using suitable example. 10
- (b) Explain various software risks and risk management activities. 10

4. (a) How object oriented analysis differs from structured analysis ? Explain using suitable example. 10
- (b) Explain the characteristics of good Software Requirement Specification (SRS) document. 10

### UNIT-III

5. Describe the following in detail :
- (a) Defensive programming. 10
- (b) Exception handling. 10
6. (a) What is cohesion ? Explain various types of cohesion using suitable example. 10
- (b) What is software design ? Explain the design principles of software engineering. 10

### UNIT-IV

7. (a) What do you mean by integration testing ? Define test stub and driver in the reference. 10
- (b) Explain boundary value analysis based testing technique using suitable example. 10
8. (a) What do you mean by white box testing ? What are its various methods ? Explain any *one* of them. 10
- (b) What is software maintenance ? Explain reverse engineering in detail using suitable example. 10
-

Roll No. ....

Total Pages : 2

**BT-6/M-20**

**36007**

**ADVANCED DATABASE SYSTEMS**

**Paper–CSE-324**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *five* questions in all selecting *one* question from each unit. All questions carry equal marks.

### **UNIT-I**

1. (a) Explain every component of parallel database architecture with neat diagram.  
(b) Explain inter-query and intra-query parallelism in parallel databases. (10+10=20)
2. (a) What is site autonomy in distributed DBMS? Consider a failure that occurs during 2PC for a transaction. For each possible failure, explain how 2PC ensure transaction atomicity and recovery despite the failure?  
(b) How does a distributed transaction differ from a remote transaction? Explain the issues related to distributed concurrency control. (10+10=20)

### **UNIT-II**

3. What is "Information Gain"? How it is computed? Explain the steps required to generate a Decision Tree from a training data set. 20

4. (a) Write a detailed note on counting co-occurrences.
- (b) Define binary scaled, nominal scaled, interval scaled ordinal scaled data types in clustering. (10+10 = 20)

### **UNIT-III**

5. Differentiate between ORDBMS, OODBMS and RDBMS. Explain the challenges in implementing an ORDBMS. 20
6. What is object structure in OODBMS? Write a detailed note on type hierarchy and inheritance. 20

### **UNIT-IV**

7. Differentiate between temporal, non-temporal and bi-temporal databases. Discuss the challenges of implementing a temporal database. 20
  8. (a) How you will ensure integrated access to multiple data sources? Explain.
  - (b) What is a mobile database? Explain the mobile computing environment with the help of a diagram. (10+10=20)
-

**BT-6/M-20**

**36113**

COMPILER DESIGN

Paper-CSE-302N

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit.

**UNIT-I**

- 1. (a) Explain the various compiler construction tools in brief. 7½
- (b) How can you convert a regular expression to NFA? Explain using suitable examples. 7½
  
- 2. (a) Describe the language denoted by the following regular expression :
  - (i)  $0(0 | 1)^* 0$ .
  - (ii)  $((\epsilon | 0) | *)^*$ .
  - (iii)  $(0 | 1)^* 0(0 | 1)(0 | 1)$ . 7½
- (b) Explain the working of a Lexical Analyzer using a small example. 7½

**UNIT-II**

- 3. (a) Differentiate between lexical and syntactic analysis. How can you eliminate ambiguity during lexical analysis? Explain using suitable examples. 7½

- (b) What is top-down parsing? Write and explain the steps to parse  $id + id * id$  using top-down parsing.  $7\frac{1}{2}$
4. (a) Construct a recursive decent parser starting with the following grammar :
- $S \rightarrow + SS \mid - SS \mid a.$   $7\frac{1}{2}$
- (b) What is canonical LR parser? Explain using suitable examples.  $7\frac{1}{2}$

### UNIT-III

5. (a) How intermediate code is generated for declarative statement? Explain using suitable examples.  $7\frac{1}{2}$
- (b) What is meant by backpatching for Boolean expressions? Explain using suitable examples.  $7\frac{1}{2}$
6. Design and explain a target machine model using suitable examples. 15

### UNIT-IV

7. Explain the procedure for optimization of basic blocks in detail using suitable examples. 15
8. (a) What are the various source language issues? Explain using suitable examples.  $7\frac{1}{2}$
- (b) Write short note on Heap Storage Management.  $7\frac{1}{2}$
-

**BT-6/M-20**

**36114**

**ESSENTIAL OF INFORMATION TECHNOLOGY**

**Paper–CSE-304 N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

**UNIT-I**

1. (a) What is an algorithm ? Write an algorithm to check entered year is leap or not. 7
- (b) Write a program in JAVA to sort input data using Insertion Sort. Discuss its complexity also. 8
2. (a) Describe the algorithm to Insert and Delete an item from a Circular Queue. 8
- (b) Write a program to implement Linear search in Java. 7

**UNIT-II**

3. (a) What is an Array ? Write a program to find largest element in an Array. 7
- (b) Explore the concept of different parameter passing technique in Java. 8

4. (a) Write a Program to implement the concept of Constructor in Java. 8
- (b) Why do we need to use command line argument in Java ? 7

### UNIT-III

5. (a) What do you mean by Inheritance ? Write a program to implement multilevel inheritance. 10
- (b) What is the purpose to use packages in Java. 5
6. (a) Discuss the constructor overloading in detail. 7
- (b) Write short note on :
- (i) Polymorphism.
- (ii) Generalisation. 8

### UNIT-IV

7. (a) What are different types of SQL statements. 7
- (b) What do you mean by Views ? How Views are created and dropped ? 8
8. (a) Discuss ER diagram with its various notations. Also explain the conversion of ER diagram into relational schema with example. 8
- (b) Write short note on :
- (i) DROP command.
- (ii) Creating an Index. 7

Roll No. ....

Total Pages : 2

**BT-6/M-20**

**36115**

**MOBILE COMPUTING**

**Paper-CSE-306N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

**UNIT-I**

1. (a) Discuss in detail, "How the channels are allocated in Cellular systems". 7½
- (b) Differentiate 3G and 4G. 7½
2. (a) What are various subsystems used in GSM system? 7½
- (b) Differentiate FHSS and DSSS. 7½

**UNIT-II**

3. (a) Define IEEE. Write description of all IEEE 802.11 standards. 7½
- (b) Write short notes on wireless multiple access protocols.
4. (a) Discuss the working of Blue Tooth. 7½
- (b) Explain different types of handoff. 7½

### UNIT-III

5. (a) Discuss adaptive clustering for mobile wireless networks. 7½  
(b) What is CCCH? Explain different types of CCCH? 7½
6. (a) Compare MEO and LEO satellites. 7½  
(b) How the data replication is occurred in mobile computers ? 7½

### UNIT-IV

7. (a) Explain DSDV architecture in detail. 7½  
(b) Explain Temporary ordered routing algorithm (TORA) in detail. 7½
8. (a) What is a LMP? Discuss any *three* security services under LMP. 7½  
(b) Discuss the frequency ranges used for radio waves. 7½
-

Roll No. ....

Total Pages : 2

**BT-6/M-20**

**36116**

WEB TECHNOLOGY

Paper-CSE-308N

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

### UNIT-I

1. (a) Describe the role of Information Architect. 8
- (b) Explain types of Navigation Systems. 7
2. Describe, how can you create cohesive organization system. 15

### UNIT-II

3. Explain these tags with examples :
  - (a) Hyper link. 3
  - (b) Subscript and Super Script. 3
  - (c) Table. 3
  - (d) Image. 3
  - (e) Font. 3
4. Explain the types of CSS with examples. 15

### UNIT-III

5. (a) Explain pattern matching using Regular Expression in Java Script ? 10  
(b) Explain control statements in Java Script. 5
6. What do you mean by scripting languages ? Explain the features of Java Script. 15

### UNIT-IV

7. (a) Explain the features of Python Programming. 8  
(b) Write a python program to find factorial of a number. 7
8. (a) Explain data types in Python Programming. 7  
(b) Write a Python Program to find sum of even numbers. 8
-

Roll No. ....

Total Pages : 2

**BT-6/M-20**

**36117**

SOFTWARE ENGINEERING

Paper–CSE-310 N

Opt. : (I)

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) Explain the term 'software crisis' with the help of an example. 7
- (b) Elaborate the software characteristics. 8
2. (a) Draw the diagram of spiral model for software development and explain it. 5
- (b) What are the advantages of using V model? 5
- (c) What do you understand by the term 'prototype'? 5

**UNIT-II**

3. (a) Explain requirement engineering process. 5
- (b) Why feasibility study is necessary? 5
- (c) What is data flow diagram? Explain DFD with the help of suitable example. 5

4. Explain the following terms :
- (a) Software risk management.
  - (b) Software configuration management.
  - (c) Software quality assurance. 15

### **UNIT-III**

5. (a) What are the important points that should be considered while designing a software ? 5
- (b) What do you understand by 'pseudo codes'? 5
- (c) Differentiate between coupling and cohesion. 5
6. (a) Explain top-down and bottom-up design. 8
- (b) Explain function point. 7

### **UNIT-IV**

7. (a) Write a short note on structured programming. 8
- (b) Discuss acceptance testing and regression testing. 7
8. (a) Differentiate between software testing and debugging. 5
- (b) Define software maintenance. Explain its types. 5
- (c) Write a short note on software Re-engineering. 5
-

Roll No. ....

Total Pages : 2

**BT-6/M-20**

**36118**

**BUSINESS INTELLIGENCE AND ENTREPRENEURSHIP**

**Paper–HS-303N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *five* questions in all, selecting atleast *one* question from each unit. Each question carries 15 marks.

### **UNIT-I**

- 1.** Define Entrepreneur. Discuss the dynamics of entrepreneurship. Also give the various qualities of an effective entrepreneur.
- 2.** Describe the various factors affecting entrepreneurship. What is the linkages between the Entrepreneurship development and Economic development ? Explain how far entrepreneurial training is useful in affecting Entrepreneurship and economic growth in a country.

### **UNIT-II**

- 3.** What are the factors involved in sensing opportunities? Explain the sources which lead to the emergence of basic ideas. "An opportunity may be derived from the needs and problems of the society." Comment.

4. Write the meaning of product identification in terms of business opportunity. What do you understand by the term 'feasibility study'? What aspects are taken care of while carrying out technical and financial feasibility studies ? Elaborate.

### **UNIT-III**

5. How do small scale industries contribute to the socio-economic development of India? Discuss the problems faced by small scale industries.
6. Explain the following :
- (a) Use of PERT/CPM in Project Planning and Control.
  - (b) Formalities for getting NOC from Pollution Board.
  - (c) Specimen of new project report.

### **UNIT-IV**

7. Explain the role played by the following institutions in management and development of small businesses :  
(a) Director of Industries, (b) District Industry Centers, (c) CIDO, and (d) State Financial Corporations (SFCs).
8. Explain the role of SIDBI in promotion, marketing management, financial management and Export marketing of medium and small enterprises in India.
-

Roll No. ....

Total Pages : 3

**BT-6/M-20**

**36128**

ESSENTIAL OF I.T.

Paper–CSE-209N

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

### UNIT-I

1. (a) Describe the process of problem solving with proper example. 7
- (b) Draw a flowchart to find largest number among three numbers. 8
2. (a) Write an algorithm to sort the input data using insertion sort with its complexity. 7
- (b) What are basic operations of STACK ? Differentiate STACK with QUEUE. 8

### UNIT-II

3. (a) Explain different Data types available in JAVA. 7
- (b) Describe various operators along with their precedence table in JAVA. 8

4. (a) What are different Parameter passing techniques in JAVA. 8
- (b) Describe the use of SWITCH statement in JAVA with simple program. 7

### UNIT-III

5. (a) Why we use concept of Inheritance in JAVA ? Explain its different type in brief. 8
- (b) What is Polymorphism ? Discuss methodology for static and dynamic polymorphism. 7
6. (a) Illustrate the concept of Abstract Keywords with a simple program. 7
- (b) Describe the use of packages in JAVA. 8

### UNIT-IV

7. (a) What do you understand by Data independence ? Discuss with all its types. 6
- (b) Explain the use of following keys in SQL with suitable example : 9
- (i) Primary key.
- (ii) Foreign key.
- (iii) Unique key.

8. (a) Discuss various types of statements available in SQL. 7
- (b) What do you mean by views ? How views are created and dropped ? 8
-

Roll No. ....

Total Pages : 03

**BT-7/M-20**

**37001**

COMPILER DESIGN

CSE-401

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

### Unit I

1. (a) Bring out the distinction between various kinds of language processors along with a brief description of each.  
(b) What is the relationship between lexical analyzer, regular expressions and finite automata ? Describe the importance and give a brief description of each.
2. What is the significance of parsing in compilation process ? Give a brief overview of the following bringing out a description of how they are constructed :
  - (a) Predictive parser
  - (b) LR parsers.

(2)L-37001

## **Unit II**

3. Why is syntax directed translation used in a compiler ?  
Describe syntax directed translation using a suitable example.
4. (a) What is a three-address code ? Describe the various forms of representing three-address code.  
(b) Which phases of a compiler use symbol table ?  
What are the contents of a symbol table ?

## **Unit III**

5. What do you mean by run time or dynamic storage allocation ? Describe the role of activation of procedure and binding of name in the context of dynamic storage allocation. Also discuss the need of an activation record and enumerate its contents.
6. Bring out a distinction between lexical, syntactical, semantical and logical errors that may occur during compilation. How can the errors be detected ?

## Unit IV

7. Give a brief overview of the following in the context of optimization :
  - (a) Basic blocks and flow graphs
  - (b) Local and loop optimization.
8.
  - (a) What things should be taken into consideration by the code generator to generate a code ?
  - (b) What is the role of directed acyclic graph (DAG) in code generation ? Illustrate using a suitable example.

Roll No. ....

Total Pages : 03

BT-7/M-20

37002

WEB ENGINEERING

CSE-403

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

### Unit I

1. (a) In what way the cohesive organization systems can be created ? **8**
- (b) How to determine that a website needs a search system ? Also discuss the anatomy of search system. **7**
  
2. (a) Define navigation system. Discuss various types of navigation systems. What are the ways by which the cost effective and elegant navigation systems can be designed ? **8**
- (b) Identify the basic uses of Architectural Page Mockups in order to design efficient information architecture. **7**

## **Unit II**

3. (a) Explain the role of using conflict resolution in cascading style sheets. **5**
- (b) Write HTML code for displaying sample form using check boxes and radio buttons. **5**
- (c) Write a program in HTML to print a paragraph with five sentences. Each sentence should consist of a different font family, font size and font color. **5**
4. (a) Write HTML code for a single web page design for the following :
- (i) To create an unordered list and nested list **3**
- (ii) To create links to two search engines and to create a hyperlink on the picture. **3**
- (iii) To display an image that has a border of size 3, a width of 200, and a height of 350. **3**
- (b) Describe the Cascading Style Sheet (CSS) by using the Font Attributes and Text Attributes in the examples. **6**

## **Unit III**

5. Discuss the roles of the following in web application development :
- (a) Proxies **5**
- (b) Form tags **5**
- (c) URLs. **5**

6. (a) Why is the CGI used ? Identify the roles of using CGI in sending and receiving data from the web servers. **10**
- (b) How to decode any web application by CGI using PERL ? **5**

#### **Unit IV**

7. List the technical roles of the following :
- (a) SGML **5**
- (b) XSL **5**
- (c) XML using CSS. **5**
8. Discuss the working architecture of Java Server Pages. Write a script to invoke Java Beans in the designing of an efficient web application. **15**

Roll No. ....

Total Pages : 03

**BT-7/M-20**

**37003**

**STATISTICAL MODELS FOR  
COMPUTER SCIENCE  
CSE-405**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. Each question carries equal marks.

**Unit I**

1. (a) A certain firm has plants A, B and C producing, respectively, 35 percent, 15 percent and 50 percent of the total output. The probabilities of a non-defective product are, respectively, 0.75, 0.95 and 0.85. A customer receives a defective product. What is the probability that it came from plant C ? **10**  
(b) State and prove Bayes' theorem. **10**
2. (a) Out of every 100 jobs received at a computing center, 50 are of class 1, 30 of class 2, and 20 of class 3. A sample of 30 jobs is taken with replacement. Find the probability that the sample will contain ten jobs of each class. **10**

- (b) State and prove addition theorem of probability. **10**

### Unit II

3. (a) Let  $y_1, y_2, \dots, y_r$  be mutually independent discrete random variables. If  $y_i$  has Poisson distribution with parameter  $\alpha_i$ , then  $\sum_{i=1}^r y_i$  has a Poisson distribution

with parameter  $\sum_{i=1}^r \alpha_i$ . Prove. **10**

- (b) The time (measured in years), X required to complete a software project has a p.d.f. of the form :

$$f(x) = \begin{cases} Kx(1-x), & 0 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

Find the value of K. **10**

4. (a) Explain Markov property of exponential distribution. **10**
- (b) State and prove the linearity property of Expectation i.e.

$$E[Z] = E[X + Y] = E[X] + E[Y] \text{ where } Z = x + y.$$

**10**

### **Unit III**

5. Define the term stochastic process. Explain the classification of stochastic processes. **20**
6. Explain the concept of the following :
  - (a) Superposition of Independent Poisson process
  - (b) Decomposition of Independent Poisson process. **20**

### **Unit IV**

7. Explain M/G/1 queuing system. **20**
8. Explain the following :
  - (a) The Pure death process
  - (b) Machine repairman model. **20**

Roll No. ....

Total Pages : 02

BT-7/M-20

37004

SOFTWARE PROJECT MANAGEMENT  
CSE-441

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

**Unit I**

1. What do you understand by Function Point ? How is it computed ? Discuss its merits and demerits over SLOC.
2. (a) What are the staffing principles given by Boehm ? Discuss.  
(b) Which activity of software development consumes maximum efforts ? How can you reduce the efforts in that activity ? Discuss.
3. What are the different levels of processes and their corresponding attributes ? Explain.

(2)L-37004

## **Unit II**

4. What are the activities carried out in the inception phase of software development ? Discuss.
5. What are the objectives of construction phase of software development ? What activities are carried out in it ? Explain.
6. (a) What is the difference between alpha and beta testing ? Explain.  
(b) What are the artifacts associated with process planning and execution ? Discuss.

## **Unit III**

7. What are the different tools to automate the software development process ? Write a detailed note.
8. What are the core metrics for project control ? Give an overview of them.

Roll No. ....

Total Pages : 02

**BT-7/M-20**

**37007**

**SECURITY AND CRYPTOGRAPHY**

**CSE-473**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit.

**Unit I**

1. Define Crypto Analysis. Explain differential and Crypto analysis in detail with example. **15**
2. Write short notes on the following :
  - (a) RSA Algorithm **8**
  - (b) Breaking DES. **7**

**Unit II**

3. What do you mean by Digital Signatures ? Explain Secret key and Public key signatures with examples. **15**
4. (a) Explain KDC protocols in detail. **7**  
(b) Discuss secure hash algorithm with example. **8**

(2)L-37007

### **Unit III**

5. Define Virus. Explain the types of virus and virus codes. How is it spread and what are the preventive measures taken to avoid virus attacks ? **15**
6. Discuss the following :
- (a) Trojan Codes **8**
  - (b) Password technology and administration. **7**

### **Unit IV**

7. (a) Explain the security plans and policy briefly. **8**  
(b) How are security plans and damage prevented ? **7**
8. (a) Explain the security network components in detail. **8**  
(b) Discuss the level of access control and authorization. **7**

Roll No. ....

Total Pages : 02

**BT-7/M-20**

**37147**

**UNIX & LINUX PROGRAMMING**

**CSE-401-N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

### **Unit I**

1. Compare and contrast Unix commands like zip, unzip, pack, unpack, compress, uncompress. **15**
2. What are shell scripts ? Describe Linux file system structure. How shell acts as command processor ? **15**

### **Unit II**

3. What are regular expressions and filters ? Justify with examples. What are quantifiers ? Write any *one* program using awk or perl. **15**
4. How is parallel compression with Xdelta utility performed for data reduction ? **15**

(2)L-37147

### **Unit III**

5. What is chunking of data files ? Differentiate between fixed-size and variable-size content-defined chunking. **15**
6. Compare static and dynamic memory management. Also discuss static and dynamic libraries. What are various modes of vi editor ? Explain. **15**

### **Unit IV**

7. What is initialization of processes ? Write also about job control—at, batch, cron and time. How starting and stopping of processes occurs in Linux O.S ? Explain. **15**
8. Describe various networking tools like telnet, ftp and firewalls. **15**

Roll No. ....

Total Pages : 03

BT-7/M-20

37148

COMPUTER GRAPHICS AND ANIMATION

CSE-403-N

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

### Unit I

1. (a) What is meant by pointing and positioning in graphics ? Give a brief overview of the anatomy and working of one pointing and one positioning device of your choice. Also mention the applications for which they may be used.  
(b) How is a polygon filled using scan line fill algorithm ?
2. Use a pseudo code to describe the simple DDA algorithm for scan converting a line whose slope is between 0 and 45 degrees. Indicate which raster locations would be chosen by the algorithm when scan converting a line from pixel coordinate (2, 4) to pixel coordinate (9, 7).

(3)L-37148

## Unit II

3. What is the significance of defining a scene in World Coordinate System ? Why is the window-to-viewport transformation performed ? Find the position of a point  $P(6, 6)$  defined in window with diagonal vertices at  $(2, 2)$  and  $(10, 10)$  transformed onto a normalized view port.
4. Show the effect of shearing transformation on a Square  $A(0, 0)$ ,  $B(1, 0)$ ,  $C(1, 1)$  and  $D(0, 1)$  with X-shearing factor  $Sh_x = 2$ . Also find out the new position of the square if it is translated with translation parameters  $T_x = 4$  and  $T_y = 5$ .

## Unit III

5. Describe the procedure for generating 4-bit code in Cohen-Sutherland line clipping algorithm. Describe, how this code is used for clipping lines ? Also describe, how the endpoints of the clipped line will be obtained using this algorithm ?
6. Answer the following questions in short :
  - (a) Describe the projection that may preserve the relative dimensions of an object.
  - (b) What are vanishing points ?
  - (c) How is text clipping carried out ?

#### **Unit IV**

7. Describe the procedure for drawing Bezier curves. Also list out the properties of Bezier curves.
8. How are depth values used to identify hidden surface in depth buffer algorithm and priority algorithm ? Describe the two algorithms in order to bring out the distinction between the two.

Roll No. ....

Total Pages : 02

**BT-7/M-20**

**37151**

**CRYPTOGRAPHY AND INFORMATION  
SECURITY  
CSE-419N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

**Unit I**

1. (a) Define term Secrecy and explain Shannon's theorem for perfect secrecy.  
(b) Define substitution and transposition classical ciphers.
2. (a) Transform the message "Best Computer Engineering" using any *two* cipher techniques.  
(b) What is security service. Define any *two*.

**Unit II**

3. (a) Discuss Discretionary and Mandatory access control.  
(b) Explain 3-DES algorithm with example and give its merits.

**(3)L-37151**

**1**

4. (a) Explain Hashing with emphasis on Tiger and Gear Hash.
- (b) Discuss RSA cryptography with example.

### **Unit III**

5. (a) Explain Diffie Hellman key exchange algorithm.
  - (b) Discuss Gamal and Rabin Public Key cryptosystem.
6. (a) Write notes on the following :
    - (i) PGP
    - (ii) IPSEC.
  - (b) Discuss any *two* key exchange protocols.

### **Unit IV**

7. (a) What is Digital Certificate ? Discuss its usage in internet transactions.
  - (b) Discuss SHA1 in Digital Signatures.
8. (a) Explain interactive proof systems.
  - (b) Write a note on intrusion detection system.

Roll No. ....

Total Pages : 03

**BT-7/M-20**

**37154**

**EXPERT SYSTEMS**

**CSE-425N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

### **Unit I**

1. (a) Compare hill climbing algorithm and best first search techniques. 7  
(b) What is Minmax strategy for game playing ?  
Develop an algorithm for Minmax. 8
2. What is main difference between scripts and frame structures for knowledge representation ? Also write their advantages and limitations. 15

### **Unit II**

3. (a) Briefly give historical evolution of an expert system. 7

(2)L-37154

- (b) Elaborate rule-based architecture of an expert system. **8**
- 4. (a) Explain, how uncertainty is propagated through a chain of rules during consultations with an expert system ? **7**
- (b) Identify and describe two good application areas for an expert system with a medical college and hospital environment. **8**

### **Unit III**

- 5. Discuss the following expert system development phases :
  - (a) Problem Identification
  - (b) Development of prototype
  - (c) Planning a full stage system. **5,5,5**
- 6. (a) Elaborate the major problems faced in knowledge acquisition. **8**
- (b) How expert system tools help in expert system development ? **7**

### **Unit IV**

- 7. Discuss the role of the following personals in an expert system development :
  - (a) User
  - (b) Knowledge Engineer
  - (c) System Development personal. **5,5,5**

- 8.** Write notes on the following : **5,5,5**
- (a) Tuning an expert system
  - (b) Verifying an expert system
  - (c) Validating an expert system

Roll No. ....

Total Pages : 2

**BT-8/M-20**

**38001**

**NEURAL NETWORKS AND FUZZY LOGIC**

Paper–CSE-402-E

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) What is an activation function in case of an Artificial Neural Network ? What are different types of activation functions ? Give examples.  
(b) What do you understand by Training of a Neural Networks ? Explain the different methods of Training. 20
2. What are the learning rule of perceptron network. Explain in the algorithm used for training the of perceptron network. 20

**UNIT-II**

3. Explain how the Kohonen Layer is trained. Once the Kohonen layer is trained, how does it operate ? 20
4. Explain the recurrent back propagation algorithm using at least two layer Neuron model. 20

**38001/K/486**

**P. T. O.**

### UNIT-III

5. (a) What do you mean by Bi-Directional Associative memories and also write the structure of it in detail.
- (b) What are different methods to encode the association in Bi-Directional Associative memories ? 20
6. What are the characteristics of ART and also explain classification operation of ART. 20

### UNIT-IV

7. What are vector matrix multipliers ? Also explain Hop field net using electro optical matrix multipliers. 20
8. Explain the following terms :
- (a) Holographic correlator
- (b) Cognitrons
- (c) Neo-Cognitrons 20

Roll No. ....

Total Pages : 2

**BT-8/M-20**

**38002**

**INTERACTIVE COMPUTER GRAPHICS**

Paper–CSE-404-E

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) Explain frame buffer and color lookup table. Discuss the color look-up table over frame buffer.  
(b) Explain Bresenham's line drawing algorithm. Also differentiate between shadow mask and beam penetration CRT.
2. (a) Explain the working mechanism of CRT with the help of a sketch.  
(b) Explain the construction and working of a LCD plasma panel display.

**UNIT-II**

3. Obtain the point on a line with end points (0,0) and (10,5) using DDA algorithm. Also explain high resolution devices.

**38002/K/918**

**P. T. O.**

4. (a) Derive the transformation that rotates an object point  $\theta^\circ$  about the origin. Also, write the matrix representation for this rotation.
- (b) Draw flow chart of Sutherland Hodgman and explain with example.

### UNIT-III

5. Distinguish between window and a viewport. Derive the window-to-viewport transformation in terms of scaling and translation.
6. Explain the following :
  - (a) Digitizing tablet.
  - (b) Painter algorithm.
  - (c) Scaling method and area subdivision algorithm.
  - (d) Z-buffer method.

### UNIT-IV

7. (a) Explain hidden line detection and elimination algorithm.
- (b) Explain subdivision algorithm in detail.
8. What is shading model? What are the important properties of such a model? How does such a model help in 3D graphics?

Roll No. ....

Total Pages : 2

**BT-8/M-20**

**38006**

**SOFTWARE VERIFICATION, VALIDATION  
AND TESTING**

Paper–CSE-450-E

Time Allowed : 3 Hours]

[Maximum Marks : 75

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) What are the goals of the Software testing?  
Explain the software testing life-cycle in details. 8
- (b) With neat diagram, explain validation and verification activities. 7
2. Demonstrate the various black box test case using equivalence class partitioning and boundary value analysis to test a module for a payroll system. 15

**UNIT-II**

3. What is the need of test case prioritization? Explain different types of prioritization techniques. 15
4. (a) Discuss in detail about the code coverage techniques with example. 5

**38006/K/920**

**P. T. O.**

- (b) Explain the significance of control flow graph and cyclomatic complexity in white box testing technique with a pseudo code of sum and average of n numbers. 10

### **UNIT-III**

5. (a) State unit test and describe about planning and designing of Unit test. 7
- (b) Explain call graph based integration with suitable example. 8
6. (a) What are the different issues in testing the object oriented software? 8
- (b) Explain path based integration testing. 7

### **UNIT-IV**

7. (a) What is the need of automation? Discuss. 7
- (b) Discuss the criterion for the selection of testing tools. 8
8. (a) Explain advantages and disadvantages of using tools. 7
- (b) Explain the characteristics of modern tools. 8

Roll No. ....

Total Pages : 2

**BT-8/M-20**

**38009**

**DATA WAREHOUSING AND DATA MINING**

Paper–CSE-476-E

Time Allowed : 3 Hours]

[Maximum Marks : 75

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) Why is Data mining important? What are the issues and challenges in Data mining? 8
- (b) Discuss various functions of Data warehouse. 7
2. (a) Differentiate operational and information system in Data mining. 8
- (b) What are the various steps involved in Data mining process. 7

**UNIT-II**

3. (a) Differentiate Distributed and Centralize data warehouse. 7
- (b) What is multi-dimensional model? Explain in detail. 8

**38009/K/923**

**P. T. O.**

4. Write short notes on the following :

(a) Virtual data warehouse.

(b) Stationary data warehouse.  $2 \times 7\frac{1}{2} = 15$

### UNIT-III

5. Write short notes on :

(a) Meta data.

(b) Operational data.

(c) Operational database.  $3 \times 5 = 15$

6. (a) Differentiate 3-tire data warehouse architecture and 4-tire data warehouse architecture. 7

(b) What do you understand by decision support system (DSS)? Differentiate DSS and MIS. 8

### UNIT-IV

7. Discuss the role of following terms used in Data mining :

(a) Fuzzy rules.

(b) Genetic algorithm.  $2 \times 7\frac{1}{2} = 15$

8. Discuss various Statistical techniques used in Data mining in detail. 15

Roll No. ....

Total Pages : 2

**BT-8/M-20**

**38153**

**NEURAL NETWORKS AND FUZZY LOGIC**

Paper–CSE-402N

Time Allowed : 3 Hours]

[Maximum Marks : 75

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. What are the various active building blocks of Neural networks? Explain the current mirror and inverter based neuron in detail. 15
2. Distinguish between the feed forward and feedback Neural networks. Compare their input-output mapping. 15

**UNIT-II**

3. Construct a Hopfield network to associate 3×3 input images with dots and dashes. How many spurious attractors does this network have i.e. how many patterns other than dots and dashes are stable attractors? 15

**38153/K/1013**

**P. T. O.**

4. What is Backpropagation? With a schematic two-layer feed forward neural network, derive its learning algorithm. Also discuss its learning difficulties and improvements. 15

### UNIT-III

5. What is holographic correlator? Also explain Hopfield net using volume holograms. 15
6. Explain the following :
- (a) Vector matrix multiplier.
  - (b) Hopfield net using Electro-optical matrix multipliers. 7+8

### UNIT-IV

7. Explain various operations on Fuzzy sets. 15
8. Describe features of Genetic algorithm. Also define the terms chromosome, fitness function, crossover and mutation as used in genetic algorithms. 15

Roll No. ....

Total Pages : 2

**BT-8/M-20**

**38154**

**MOBILE APPS DEVELOPMENT**

Paper–CSE-404N

Time Allowed : 3 Hours]

[Maximum Marks : 75

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) What are the different features of Android OS and its applications? 10
- (b) What are the steps of setting up the mobile app development along with an emulator on Windows OS and Linux OS? 5
2. What do you mean by MENU? Explain the steps to design context menu and popup menu with an simple example. 15

**UNIT-II**

3. What are different Android Activity Life cycle methods? Explain when and why these methods are called during activity. 15

**38154/K/1014**

**P. T. O.**

4. What is use of Content provider in android app development? Write Mobile App to insert, update or delete data in a content provider. 15

### **UNIT-III**

5. Develop a mobile app to record and play back Audio clip. 15
6. What is use of SQLite database? Write a mobile app to save (number data type, text data type and boolean data type) in SQLite. 15

### **UNIT-IV**

7. (a) What do you mean by White box testing and Black box testing? 8
- (b) What are different steps to debug mobile app in Visual studio? 7
8. Write JUnit program to test for factorial calculating mobile app. 15

Roll No. ....

Total Pages : 2

**BT-8/M-20**

**38155**

## **SOFTWARE TESTING**

Paper–CSE-412-N (E-III)

Time Allowed : 3 Hours]

[Maximum Marks : 75

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

### **UNIT-I**

1. (a) Illustrate with suitable examples the principles of Software testing. 8
- (b) With neat diagram, explain validation and verification activities. 7
2. (a) Why is it impossible for a tester to find all the bugs in a system? Why might it not be necessary for a program to be completely free of defects before it is delivered to its customers? 10
- (b) Write a note on Origins of defects. 5

### **UNIT-II**

3. Demonstrate various kinds of loops with respect to path testing using neat diagrams.

**38155/K/1015**

**P. T. O.**

- What are decision tables? Draw the decision table for triangle problem. 15
4. (a) Discuss in detail about the code coverage techniques with example. 5
- (b) Explain the significance of control flow graph and cyclomatic complexity in white box testing technique with a pseudo code of sum and average of n numbers. 10

### **UNIT-III**

5. (a) Draw the control flow graph and show coverage criteria for given code. 7
- (b) Explain call graph based integration with suitable example. 8
6. (a) State unit test and describe about planning and designing of Unit test. 8
- (b) Explain path based integration testing. 7

### **UNIT-IV**

7. How can you test the performance. Testing of web-based applications? Discuss with example. 15
8. (a) Discuss Object Oriented Integration techniques. 7
- (b) Explain Database testing. 8

Roll No. ....

Total Pages : 3

**BT-8/M-20**

**38159**

**CLOUD COMPUTING (E-IV)**

Paper–CSE-420-N

Time Allowed : 3 Hours]

[Maximum Marks : 75

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) Make the systematic differences among the grid computing environment, distributed computing environment and their related interfaces mechanisms. 8
- (b) What pros and cons of cloud computing exist in comparisons of cluster and utility computing? 7
2. (a) Discuss the principles of security in cloud computing. What are the various business driver for adopting cloud computing in a secure way. 10
- (b) Difference between elasticity and scalability in cloud computing. 5

**38159/K/1019**

**P. T. O.**

## UNIT-II

3. (a) Explain in detail about the Software as a Services (SaaS). Mention out the advantages and drawbacks of SaaS. What are the various service providers of SaaS? 8
- (b) Write down the characteristics of community cloud, public cloud and hybrid cloud. 7
4. (a) How many types of development models are used in cloud computing environment? Which one is best and why? 8
- (b) What is the role of resource scheduler in the Infrastructure as a Service (IaaS) layer cloud interfaces? 7

## UNIT-III

5. (a) What is web-service? Differentiate between SOAP and REST web-services which are used in cloud computing. 8
- (b) Write the technical notes on the Service Level Agreements (SLAs) and Scalability. 7
6. (a) Explain in detail about the working architecture of Amazon EC2. What types of services does it provide for the proper management of different resources in cloud computing environment? 10

- (b) What is storage virtualization in Cloud computing? Enlist pitfalls of virtualization. 5

#### **UNIT-IV**

7. (a) Discuss in detail the cloud security reference model and explain, how cloud security is integrated into the design of the efficient and reliable applications interfaces. 8
- (b) Write different types of internal security breaches in cloud computing. Also, explain the steps to reduce cloud security breaches. 7
8. (a) Explain in technical differences and their implementation details among network level security and application level security in cloud computing. 8
- (b) Explain the concept of Data security and Storage management in cloud computing. 7

Roll No. ....

Total Pages : 04

**BT-4/M-20**

**34067**

**MATHEMATICS-III**

**MATH-201-E**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

**Unit I**

1. (a) If  $f(x) = |\cos x|$ , expand  $f(x)$  as a Fourier series in the interval  $(-\pi, \pi)$ . **10**

(b) Obtain the Fourier expansion of  $x \sin x$  as a cosine series in  $(0, \pi)$ . Hence show that : **10**

$$\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \dots \dots \dots \infty = \frac{\pi - 2}{4}.$$

2. (a) Find the Fourier cosine transform of  $e^{-x^2}$ . **10**

(b) Use Parseval's identities, prove that : **10**

$$\int_0^{\infty} \frac{t^2}{(t^2 + 1)^2} dt = \frac{\pi}{4}.$$

## Unit II

3. (a) Find the regular function whose imaginary parts is  $e^{-x}(x \sin y - y \cos y)$ . **10**

- (b) If  $f(z)$  is regular function of  $z$ , prove that : **10**

$$\left( \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4|f'(z)|^2$$

4. (a) If  $\cos(\alpha + i\beta) = r(\cos \theta + i \sin \theta)$ , prove that : **10**

$$e^{2\beta} = \frac{\sin(\alpha - \theta)}{\sin(\alpha + \theta)}$$

- (b) If  $u = \log \tan\left(\frac{\pi}{4} + \frac{\theta}{2}\right)$ , prove that : **10**

(i)  $\tanh \frac{u}{2} = \tan \frac{\theta}{2}$

(ii)  $\theta = -i \log \tan\left(\frac{\pi}{4} + \frac{iu}{2}\right)$

## Unit III

5. (a) If  $P(A) = \frac{1}{4}$ ,  $P(B) = \frac{1}{3}$  and  $P(A \cup B) = \frac{1}{2}$ , evaluate :

(i)  $P(A/B)$

(ii)  $P(B/A)$

(iii)  $P(A \cap B')$  **10**

(b) The contents of three urns are : 1 white, 2 red, 3 green balls; 2 white, 1 red, 1 green balls and 4 white, 5 red, 3 green balls. Two balls are drawn from an urn chosen at random. These are found to be one white and one green. Find the probability that the balls so drawn came from the third urn.

**10**

6. (a) If the probability that a new born child is a male is 0.6, find the probability that in a family of 5 children there are exactly 3 boys.

**10**

(b) Explain the main properties of Normal distribution.

**10**

#### **Unit IV**

7. (a) Use graphical method, solve the following Linear Programming problem :

**10**

$$\text{Maximize } Z = 2x_1 + 3x_2$$

Subject to :

$$x_1 - 3x_2 \leq 2$$

$$x_1 + x_2 \geq 4$$

$$x_1, x_2 \geq 0$$

- (b) Find all the basic solutions of the following system of equations identifying in each case the basic and non-basic variables : **10**

$$2x_1 + x_2 + 4x_3 = 11$$

$$3x_1 + x_2 + 5x_3 = 14$$

8. Using dual Simplex method, solve the following problem : **20**

$$\text{Maximize } Z = 2x_1 + 2x_2 + 4x_3$$

Subject to :

$$2x_1 + 3x_2 + 5x_3 \geq 2$$

$$3x_1 + x_2 + 7x_3 \leq 3$$

$$x_1 + 4x_2 + 6x_3 \leq 5$$

$$x_1, x_2, x_3 \geq 0$$

Roll No. ....

Total Pages : 02

**BT-4/M-20**

**34070**

**BASICS OF ECONOMICS AND  
MANAGEMENT  
HUM-201E**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt any *Five* questions.

1. Discuss the Law of Variable Proportions.
2. Discuss the various concepts of cost curves. How do they differ in short-run and long-run ?
3. “Management is a science like Physics or Chemistry.” Do you agree with this statement ? Give reasons in support of your answer.
4. Define Management. Discuss the principles of management in brief.
5. Explain and differentiate the term strategy and policy.

**(3)L-34070**

**1**

6. Define Centralisation and discuss its merits and demerits.
7. Define Recruitment. What are the types of internal sources of recruitment ? Evaluate them.
8. Explain PERT with example. Also explain its advantages and limitations.

Roll No. ....

Total Pages : 03

BT-4/M-20

34091

MATHEMATICS-III

AS-201N

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

### Unit I

1. (a) Obtain a Fourier series to represent  $e^{-ax}$  from  $x = -\pi$  to  $x = \pi$ . 7½  
(b) Obtain the half-range sine series for  $e^x$  in  $0 < x < 1$ . 7½
2. (a) Find the Fourier cosine transform of  $e^{-x^2}$ . 7½  
(b) State and prove convolution theorem for Fourier Transforms. 7½

### Unit II

3. (a) If  $u = \log \tan\left(\frac{\pi}{4} + \frac{\theta}{2}\right)$ ; then prove that :

(3)L-34091

- (i)  $\tanh \frac{u}{2} = \tan \frac{\theta}{2}$
- (ii)  $\cosh u = \sec \theta$ . 7½
- (b) Separate  $\sin^{-1}(\cos \theta + i \sin \theta)$  into real and imaginary parts, where  $\theta$  is a positive acute angle. 7½
4. (a) Show that the function  $f(z) = \sqrt{|xy|}$ , is not analytic at the origin, even though Cauchy-Riemann equations are satisfied thereat. 7½
- (b) If  $f(z)$  is a regular function of  $z$ , prove that : 7½

$$\left( \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4|f'(z)|^2$$

### Unit III

5. (a) The contents of three urns are 1 white, 2 red, 3 green balls; 2 white, 1 red, 1 green balls and 4 white, 5 red, 3 green balls. Two balls are drawn from an urn chosen at random. These are found to be one white and one green. Find the probability that the balls so drawn came from the third urn. 7½
- (b) Fit a binomial distribution to the following frequency distribution : 7½

$x$	:	0	1	2	3	4	5	6
$f$	:	13	25	52	58	32	16	4

6. (a) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and S.D. of the distribution. 7½
- (b) A random variable  $x$  has the following probability function :
- |        |   |     |     |     |      |     |     |
|--------|---|-----|-----|-----|------|-----|-----|
| $x$    | : | -2  | -1  | 0   | 1    | 2   | 3   |
| $f(x)$ | : | 0.1 | $k$ | 0.2 | $2k$ | 0.3 | $k$ |
- Find  $k$ , mean, variance and S.D. 7½

#### Unit IV

8. Using simplex method, solve the following linear programming problem :
- Minimize  $Z = x_1 - 3x_2 + 2x_3$   
 Subject to constraints
- $$3x_1 - x_2 + 2x_3 \leq 7$$
- $$- 2x_1 + 4x_2 \leq 12$$
- $$- 4x_1 + 3x_2 + 8x_3 \leq 10$$
- $$x_1, x_2, x_3 \geq 0. \quad \mathbf{15}$$
9. Using dual simplex method, solve the following LPP :
- Maximize  $Z = - 3x_1 - x_2$   
 Subject to
- $$x_1 + x_2 \geq 1$$
- $$2x_1 + 3x_2 \geq 2$$
- $$x_1, x_2 \geq 0. \quad \mathbf{15}$$

Roll No. ....

Total Pages : 03

**BT-4/M-20**

**34103**

FUNDAMENTALS OF MANAGEMENT

HS-201N

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

### **Unit I**

1. Explain the Human Relations Movement. Highlight the major contributors, principles and functions of Human Relations School of management. Also highlight its relevance in the present time.
2. Attempt the following :
  - (a) Elaborate the contingency approach to management. Brief its key managerial implications.
  - (b) Why is management described as an art and a science ? Justify.

**(3)L-34103**

**1**

## **Unit II**

3. Define Delegation of Authority. Is it different from Decentralisation ? Identify the factors or circumstances, which favour Delegation of Authority approach.
4. Define Organisational Structure. Is it different from Organisational Design ? Throw light on major types of Organisational Structure, which are widely recognised in the corporate sector.

## **Unit III**

5. What is Training Needs Identification ? Why is this considered as an important step of training process ? Discuss the methods through which training needs assessment can be performed.
6. Describe the following theories along with their practical implications :
  - (a) Two factor theory/Motivation-Hygiene theory
  - (b) Management Grid Theory.

#### **Unit IV**

7. Why the concept of Corporate Social Responsibility has been gaining importance day by day ? Mention arguments in favour of CSR as well as against it.
8. Elaborate the concept of MIS. Discuss its key functions. What are the advantages of MIS to a firm using it ? Highlight some of new trends/developments in MIS.

Roll No. ....

Total Pages : 04

**BT-4/M-20**

**34114**

**MATHEMATICS-III**

**AS-201N (Opt. I)**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

**Unit I**

1. (a) Find the Fourier series of the function given by : 7½

$$f(x) = \begin{cases} 0 & -\pi \leq x < 0 \\ \pi & 0 \leq x < \pi \end{cases}$$

- (b) Develop  $\sin\left(\frac{\pi x}{l}\right)$  in half-range cosine series in the range  $0 < x < l$ . 7½

2. (a) Find the Fourier sine transform of  $\frac{e^{-ax}}{x}$ . 7½

- (b) Using Parseval's identity, prove that : 7½

$$\int_0^{\infty} \frac{\sin 3t}{t(9+t^2)} .dt = \frac{\pi}{18} (1 - e^{-9})$$

(2)L-34114

## Unit II

3. Use the simple method to solve the following LP problem :

$$\text{Maximize } z = 3x_1 + 5x_2 + 4x_3$$

subject to :

$$2x_1 + 3x_2 \leq 8$$

$$2x_2 + 5x_3 \leq 10$$

$$3x_1 + 2x_2 + 4x_3 \leq 15$$

$$x_1, x_2, x_3 \geq 0. \quad \mathbf{15}$$

4. (a) Using Graphical method : **7½**

$$\text{Maximize } z = -3x_1 - x_2$$

subject to :

$$x_1 + x_2 \geq 1$$

$$2x_1 + 3x_2 \geq 2$$

$$x_1, x_2 \geq 0$$

- (b) Explain the following terms : **2½×3**

- (i) Feasible Solution
- (ii) Convex Region
- (iii) Unbounded Solutions.

### Unit III

5. (a) If  $u = \log \tan\left(\frac{\pi}{4} + \frac{\theta}{2}\right)$ , then prove that :  $7\frac{1}{2}$

(i)  $\tanh \frac{u}{2} = \tan \frac{\theta}{2}$

(ii)  $\cosh u = \sec \theta$

(b) Prove that  $u = x^2 - y^2 - 2xy - 2x + 3y$  is harmonic.  
Find a function  $v$  such that  $f(z) = u + iv$  is analytic.  
Also express  $f(z)$  in terms of  $z$ .  $7\frac{1}{2}$

6. (a) Evaluate :  $7\frac{1}{2}$

$$\oint_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz,$$

where  $C$  is the circle  $|z|=3$ .

(b) Evaluate :

$$\int_C (y - x - 3x^2 i) dz$$

where  $C$  is the straight line from  $z = 0$  to  
 $z = 1 + i$ .  $7\frac{1}{2}$

### Unit IV

7. (a) Three urns contain 6 red, 4 black; 4 red, 6 black  
and 5 red, 5 black balls respectively. One of the

urns is selected at random and a ball is drawn from it. If the ball drawn is red, find the probability that it is drawn from the first urn.  $7\frac{1}{2}$

(b) In a normal distribution, 35% of the items are under 40 and 10% are over 60. Find the mean and standard deviation of the distribution.  $7\frac{1}{2}$

8. (a) A random variable X has the following probability distribution :

$$x \quad : \quad -3 \quad -2 \quad -1 \quad 0 \quad 1$$

$$P(x) \quad : \quad 0.2 \quad k \quad 0.3 \quad 3k \quad 0.1$$

Find the value of  $k$  and calculate mean and variance.

$7\frac{1}{2}$

(b) In 800 families with 5 children each, how many families would be expected to have (i) 2 boys and 3 girls (ii) at the most two girls ? (Assume probabilities for boys and girls to be equal).  $7\frac{1}{2}$

Roll No. ....

Total Pages : 04

**BT-4/M-20**

**34120**

**MATHEMATICS-III**

**AS-201N**

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit.

**Unit I**

1. (a) Find the Fourier series for the function for :

$$f(x) = \begin{cases} \pi x & 0 \leq x \leq 1 \\ \pi(2-x) & 1 \leq x \leq 2 \end{cases}$$

and deduce that  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots \infty = \frac{\pi^2}{8}$ . 7½

- (b) Express  $f(x) = x$  as a half-range cosine series in  $0 < x < 2$ . 7½

2. (a) Find the Fourier cosine transform of  $f(x) = \frac{1}{1+x^2}$ .  
Hence derive Fourier sine transform of

$$\phi(x) = \frac{x}{1+x^2}. \quad 7\frac{1}{2}$$

- (b) Using Parseval's identity, show that : 7½

$$\int_0^{\infty} \frac{t^2}{(t^2+1)^2} dt = \frac{\pi}{4}$$

### Unit II

3. (a) Solve : 7½

$$p + 3q = z + \cot(y - 3x),$$

where  $p = \frac{\partial z}{\partial x}$ ,  $q = \frac{\partial z}{\partial y}$ .

- (b) Solve : 7½

$$\frac{\partial^3 z}{\partial x^3} - 4 \frac{\partial^3 z}{\partial x^2 \partial y} + 5 \frac{\partial^3 z}{\partial x \partial y^2} - 2 \frac{\partial^3 z}{\partial y^3} = e^{2x+y}$$

4. Solve the following linear programming problem by simplex method : 15

Maximize  $Z = 5x_1 + 3x_2$

Subject to :

$$x_1 + x_2 \leq 2$$

$$5x_1 + 2x_2 \leq 10$$

$$3x_1 + 8x_2 \leq 12$$

$$x_1, x_2 \geq 0$$

### Unit III

5. (a) If  $\cos(\alpha + i\beta) = r(\cos\theta + i\sin\theta)$ , prove that : 7½

$$e^{2\beta} = \frac{\sin(\alpha - \theta)}{\sin(\alpha + \theta)}$$

- (b) Find the analytic function, whose real part is : 7½

$$\frac{\sin 2x}{\cosh 2y - \cos 2x}$$

6. (a) Find the Laurent's expansion of  $\frac{e^{2z}}{(z-1)^3}$  about the singularity  $z = 1$ . 7½

- (b) Evaluate, using Cauchy's integral formula

$$\oint_C \frac{e^{2z}}{(z+i)^4} dz, \text{ where } C \text{ is the circle } |z|=3. \quad 7\frac{1}{2}$$

### Unit IV

7. (a) A can hit a target 3 times in 5 shots, B can hit 2 times in 5 shots and C can 3 times in 4 shots. They fire a volley. What is the probability that (i) Two shots hit (ii) At least two shots hit. 7½

- (b) A random variable X has the following probability function :

$x$	0	1	2	3	4	5	6	7
$P(x)$	0	$k$	$2k$	$2k$	$3k$	$k^2$	$2k^2$	$7k^2 + k$

Find :

- (i)  $k$
- (ii) Evaluate  $P(X < 6)$ ,  $P(X \leq 6)$
- (iii)  $P(0 < X < 5)$ . **7½**
- 8.** (a) The probability that a pen manufactured by a company will be defective is  $\frac{1}{10}$ . If 12 such pens manufactured, find the probability that :
- (i) Exactly two will be defective
- (ii) at least two will be defective.
- (iii) None will be defective. **10**
- (b) If A and B be two events with  $P(A) = \frac{1}{2}$ ,  $P(B) = \frac{1}{3}$  and  $P(A \cap B) = \frac{1}{4}$ . Find (i)  $P(A|B')$  (ii)  $P(A \cup B)$ . **5**