

**KLE Dr. M.S.SHESHGIRI
COLLEGE OF ENGINEERING & TECHNOLOGY
UDYAMBAG, BELAGAVI – 590008.**

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QUESTION PAPERS

3rd, 4th, 5th, 6th, 7th & 8th SEMESTER

COMPUTER SCIENCE

JUNE / JULY 2019

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17MAT31

Third Semester B.E. Degree Examination, June/July 2019 Engineering Mathematics – III

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Obtain the fourier series of the function $f(x) = x - x^2$ in $-\pi \leq x \leq \pi$ and

hence deduce $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$

(08 Marks)

- b. Obtain the Half Range Fourier cosine series for the $f(x) = \sin x$ in $[0, \pi]$.

(06 Marks)

- c. Obtain the constant term and the coefficients of first sine and cosine terms in the fourier expansion of y given

x:	0	1	2	3	4	5
y:	9	18	27	28	26	20

(06 Marks)

OR

- 2 a. Obtain the fourier series of $f(x) = \frac{\pi - x}{2}$ in $[0, 2\pi]$ and hence deduce that

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$$

(08 Marks)

- b. Find the fourier half range cosine series of the function $f(x) = 2x - x^2$ in $[0, 3]$.

(06 Marks)

- c. Express y as a fourier series upto first harmonic given

x:	0	30	60	90	120	150	180	210	240	270	300	330
y:	1.8	1.1	0.30	0.16	1.5	1.3	2.16	1.25	1.3	1.52	1.76	2.0

(06 Marks)

Module-2

- 3 a. Find the fourier transform of $f(x) = \begin{cases} a^2 - x^2; & |x| \leq a \\ 0 & ; |x| > a \end{cases}$ and hence deduce

$$\int_0^{\pi} \frac{\sin x - x \cos x}{x^3} dx = \frac{\pi}{4}$$

(08 Marks)

- b. Find the fourier sine transform of e^{-x} and hence evaluate $\int_0^{\infty} \frac{x \sin ax}{1+x^2} dx; a > 0$

(06 Marks)

- c. Obtain the z-transform of $\cos n\theta$ and $\sin n\theta$.

(06 Marks)

OR

- 4 a. Find the fourier transform of $f(x) = xe^{-x}$.

(08 Marks)

- b. Find the fourier cosine transform of $f(x)$ where

$$f(x) = \begin{cases} x & 0 < x < 1 \\ 2-x & 1 < x < 2 \\ 0 & ; x > 2 \end{cases}$$

(06 Marks)

- c. Solve $u_{n+2} + 6u_{n+1} + 9u_n = 2^n$ with $u_0 = u_1 = 0$ using z-transform. (06 Marks)

Module-3

- 5 a. Fit a straight line $y = ax + b$ for the following data by the method of least squares.

x:	1	3	4	6	8	9	11	14
y:	1	2	4	4	5	7	8	9

(08 Marks)

- b. Calculate the coefficient of correlation for the data:

x:	92	89	87	86	83	77	70	63	53	50
y:	86	83	91	77	68	85	54	82	37	57

(06 Marks)

- c. Compute the real root of $x \log_{10} x - 1.2 = 0$ by the method of false position. Carry out 3 iterations in (2, 3). (06 Marks)

OR

- 6 a. Fit a second degree parabola to the following data $y = a + bx + cx^2$.

x:	1	1.5	2	2.5	3	3.5	4
y:	1.1	1.3	1.6	2	2.7	3.4	4.1

(08 Marks)

- b. If θ is the angle between two regression lines, show that

$$\tan \theta = \left(\frac{1-r^2}{r} \right) \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}; \text{ explain significance of } r=0 \text{ and } r=\pm 1. \quad (06 \text{ Marks})$$

- c. Using Newton Raphson method, find the real root of the equation $3x = \cos x + 1$ near $x_0 = 0.5$. Carry out 3 iterations. (06 Marks)

Module-4

- 7 a. From the following table, estimate the number of students who obtained marks between 40 and 45.

Marks	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of students	31	42	51	35	31

(08 Marks)

- b. Use Newton's dividend formula to find $f(9)$ for the data.

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

(06 Marks)

- c. Find the approximate value of $\int_0^{\pi/2} \sqrt{\cos \theta} d\theta$ by Simpson's $\frac{1}{3}$ rd rule by dividing $\left[0, \frac{\pi}{2}\right]$ into 6 equal parts. (06 Marks)

OR

- 8 a. The area A of a circle of diameter d is given for the following values:

d	80	85	90	95	100
A	5026	5674	6362	7088	7854

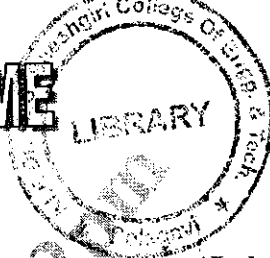
Calculate the area of circle of diameter 105 by Newton's backward formula. (08 Marks)

- b. Using Lagrange's interpolation formula to find the polynomial which passes through the points (0, -12), (1, 0), (3, 6), (4, 12). (06 Marks)

- c. Evaluate $\int_{5.2}^{\dots} \log_e x dx$ taking 6 equal parts by applying Weddle's rule. (06 Marks)

Module-5

- 9 a. If $\vec{F} = 3xy\hat{i} - y^2\hat{j}$, evaluate $\int_C \vec{F} \cdot d\vec{r}$ where 'C' is arc of parabola $y = 2x^2$ from (0, 0) to (1, 2) (08 Marks)
- b. Evaluate by Stokes theorem $\oint_C (\sin z dx - \cos x dy + \sin y dz)$, where C is the boundary of the rectangle $0 \leq x \leq \pi$; $0 \leq y \leq 1, z = 3$ (06 Marks)
- c. Prove that the necessary condition for the $I = \int_{x_1}^{x_2} f(x, y, y') dx$ to be extremum is $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$ (06 Marks)
- OR
- 10 a. Using Green's theorem evaluate $\int_C (3x^2 - y^2) dx + (4y - 6xy) dy$, where C is the boundary of the region bounded by the lines $x = 0, y \neq 0, x + y = 1$. (08 Marks)
- b. Find the external value of $\int_0^{\pi/2} [(y')^2 + y^2 + 4y \cos x] dx$. Given that $y(0) = 0, y\left(\frac{\pi}{2}\right) = 0$. (06 Marks)
- c. Prove that the shortest distance between two points in a plane is along a straight line joining them. (06 Marks)



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17MATDIP31

Third Semester B.E. Degree Examination, June/July 2019
Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find the sine of the angle between $\vec{a} = 2\hat{i} - 2\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + 2\hat{k}$. (08 Marks)
- b. Express the complex number $\frac{(1+i)(1+3i)}{1+5i}$ in the form $a + ib$. (06 Marks)
- c. Find the modulus and amplitude of $\frac{(1+i)^2}{3+i}$. (06 Marks)

OR

- 2 a. Show that $(1 + \cos \theta + i \sin \theta)^n + (1 + \cos \theta - i \sin \theta)^n = 2^{n+1} \cdot \cos^n \left(\frac{\theta}{2} \right) \cdot \cos \left(\frac{n\theta}{2} \right)$. (08 Marks)
- b. If $\vec{a} = 2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\vec{b} = 8\hat{i} - 4\hat{j} + \hat{k}$, then prove that \vec{a} is perpendicular to \vec{b} . Also find $|\vec{a} \times \vec{b}|$. (06 Marks)
- c. Determine λ such that $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} - 4\hat{k}$ and $\vec{c} = \hat{i} + \lambda\hat{j} + 3\hat{k}$ are coplanar. (06 Marks)

Module-2

- 3 a. If $y = \cos(m \log x)$ then prove that $x^2 y_{n+2} + (2n+1)xy_{n+1} + (m^2 + n^2)y_n = 0$. (08 Marks)
- b. Find the angle of intersection of the curves $r^2 \sin 2\theta = a^2$ and $r^2 \cos 2\theta = b^2$. (06 Marks)
- c. Find the pedal equation of the curve $r = a(1 + \sin \theta)$. (06 Marks)

OR

- 4 a. Obtain the Maclaurin's series expansion of $\log \sec x$ up to the terms containing x^6 . (08 Marks)
- b. If $u = \operatorname{cosec}^{-1} \left(\frac{x^{\frac{1}{2}} + y^{\frac{1}{2}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}} \right)$, prove that $xu_x + yu_y = -\frac{1}{6} \tan u$. (06 Marks)
- c. Find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ where $u = x + y + z$, $v = y + z$, $w = z$. (06 Marks)

Module-3

- 5 a. Obtain a reduction formula for $\int_0^{\pi/2} \sin^n x dx$, $(n > 0)$. (08 Marks)
- b. Evaluate $\int_0^{2a} x^2 \sqrt{2ax - x^2} dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy dy dx$. (06 Marks)

OR

- 6 a. Evaluate $\int_0^a \int_0^{x+y} \int_0^{x+y+z} e^{x+y+z} dz dy dx$. (08 Marks)
- b. Evaluate $\int_0^\infty \frac{x^6}{(1+x^2)^{9/2}} dx$. (06 Marks)
- c. Evaluate $\iint_A xy dx dy$ where A is the area bounded by the circle $x^2 + y^2 = a^2$ in the first quadrant. (06 Marks)

Module-4

- 7 a. A particle moves along the curve $\vec{r} = \cos 2t \hat{i} + \sin 2t \hat{j} + t \hat{k}$. Find the components of velocity and acceleration at $t = \frac{\pi}{8}$ along $\sqrt{2} \hat{i} + \sqrt{2} \hat{j} + \hat{k}$. (08 Marks)
- b. Find divergence and curl of the vector $\vec{F} = (xyz + y^2z) \hat{i} + (3x^2 + y^2z) \hat{j} + (xz^2 - y^2z) \hat{k}$. (06 Marks)
- c. Find the directional derivative of $\phi = x^2yz^3$ at (1, 1, 1) in the direction of $\hat{i} + \hat{j} + 2\hat{k}$. (06 Marks)

OR

- 8 a. Find the angle between the tangents to the curve $x = t^2, y = t^3, z = t^4$ at $t = 2$ and $t = 3$. (08 Marks)
- b. Find $\text{curl}(\text{curl } \vec{A})$ where $\vec{A} = xy \hat{i} + y^2z \hat{j} + z^2y \hat{k}$. (06 Marks)
- c. Find the constants a, b, c such that the vector field $(\sin y + az) \hat{i} + (bx \cos y + z) \hat{j} + (x + cy) \hat{k}$ is irrotational. (06 Marks)

Module-5

- 9 a. Solve $\frac{dy}{dx} = \frac{y}{x} + \sin\left(\frac{y}{x}\right)$. (08 Marks)
- b. Solve $\frac{dy}{dx} + y \cot x = \sin x$. (06 Marks)
- c. Solve $\frac{dy}{dx} + \frac{y}{x} = y^2x$. (06 Marks)

OR

- 10 a. Solve $x^2 y dx - (x^3 + y^3) dy = 0$. (08 Marks)
- b. Solve $x^2 \frac{dy}{dx} = 3x^2 - 2xy + 1$. (06 Marks)
- c. Solve $\left[y \left(1 + \frac{1}{x} \right) + \cos y \right] dx + [x + \log x - x \sin y] dy = 0$. (06 Marks)

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Third Semester B.E. Degree Examination, June/July 2019

Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing
ONE full question from each module.**

Module-1

- 1 a. List any 4 differences between JFET and MOSFET. (04 Marks)
- b. Explain with help of neat diagram the working of N-channel JFET and sketch its characteristics. (08 Marks)
- c. With help of block diagram explain the operation of a astable multivibrator using IC 555. (08 Marks)

OR

- 2 a. Sketch and explain the working of peak detector. (06 marks)
- b. State and explain any four performance parameters of an operational amplifier. (08 marks)
- c. Illustrate the various types of filters with neat diagram and definitions. (06 Marks)

Module-2

- 3 a. Use a Karnaugh map to find minimum SOP form for the following Boolean function :
 $f(a, b, c, d) = \sum m(0, 2, 3, 5, 6, 7, 8, 9) + d(10, 11, 12, 13, 14, 15)$.
 Also draw the logic circuit diagram for the simplified SOP. (10 Marks)
- b. Apply Quine Mc-clusky method to find essential prime implicants for the Boolean function
 $f(a, b, c, d) = \sum m(1, 3, 6, 7, 10, 12, 13, 14, 15)$.
 Write prime implicant table. (10 Marks)

OR

- 4 a. There are 4 adjacent parking slots in Mega Inc. executive parking area. Each slot is equipped with sensor whose output is asserted high when a car is occupying the slot. Write a truth table so that the output is high if two or more vacant parking is available.
 - i) Write truth table
 - ii) Find the expression of the system that will signal the existence of two or more vacant slots
 - iii) Simplify the expression
 - iv) Draw the logic diagram for simplified expression. (10 Marks)
- b. Briefly explain an HDL implementation models. And write the HDL program for the following circuit shown in using in figure Fig.Q4(b) using structural model. (07 Marks)

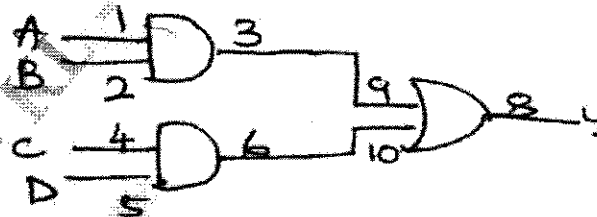


Fig.Q4(b)

- c. What is hazards? List the types of hazards. (03 Marks)

Module-3

- 5 a. Implement the full adder outputs using 3 – 8 decoder. (07 marks)
 b. Design one bit magnitude comparator and implement it using de-multiplexer (08 Marks)
 c. Distinguish between combinational and sequential circuit. (05 Marks)

OR

- 6 a. Design a seven segment display using PLA. (10 Marks)
 b. Show how 1 : 4 de-multiplexer is used to get 1 : 16 de-multiplexer. (04 Marks)
 c. With the help of block diagram explain PAL and PLA. (06 Marks)

Module-4

- 7 a. The sequence 1011 is applied to the output of a 4 bit serial shift register that is initially cleared. With the help of diagram show how sequence is being entered serially into the register. (08 Marks)
 b. Design a self correcting modulo-6 counter in which all the unused state leads to state ABC = 000. (08 Marks)
 c. Draw the logic diagram, truth table and waveforms for a two flip-flop ripple counter. (04 Marks)

OR

- 8 a. Sketch a ring counter and Johnson counter and write its truth table. (08 Marks)
 b. Explain how toggle flip-flop is used as frequency divider circuit. Sketch the output waveforms. (08 Marks)
 c. A 4-bit binary asynchronous counter is connected. With a clock of 500 KHz frequency. Find the time period of the wave forms at the o/p of all the flop-flops. (04 Marks)

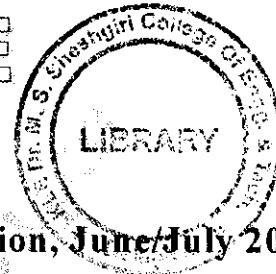
Module-5

- 9 a. Design synchronous counter for the sequence 1 – 3 – 5 – 7 – 1 using J-K flip-flop. (12 Marks)
 b. Explain digital clock with neat diagram. (04 Marks)
 c. Explain the terms accuracy and resolution for D/A converter. (04 Marks)

OR

- 10 a. Explain with block diagram the operation of successive approximation ADC. (08 Marks)
 b. Explain the binary ladder with digital input 1100. (08 Marks)
 c. For a 5 bit resistive divider, determine the following :
 i) Weight assigned to binary
 ii) Weight assigned to second and third LSB
 iii) The change in output voltage due to a change in the LSB, the second LSB and the third LSB
 iv) The output voltage for a digital input of 10101.
 Assume 0 = 0V and 1 = +10V.

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17CS33

Third Semester B.E. Degree Examination, June/July 2019
Data Structures and Applications

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Data structures. Give its classification. What are the basic operations that can be performed on data structure? (08 Marks)
- b. Give the ADT for sparse matrix. Express the given sparse matrix in the triplet form and find its transpose.

$$A = \begin{bmatrix} 10 & 0 & 0 & 25 & 0 \\ 0 & 23 & 0 & 0 & 45 \\ 0 & 0 & 0 & 0 & 32 \\ 42 & 0 & 0 & 31 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \end{bmatrix}$$

(08 Marks)

- c. Consider the given 2 polynomials

$$A(x) = 4x^{15} + 3x^4 + 5 \quad \text{and} \quad B(x) = x^4 + 10x^2 + 1$$

Represent the polynomials using Array of structures.

(04 Marks)

OR

- 2 a. Explain the dynamic memory allocation functions in detail. (08 Marks)
- b. Write a C program using pointers to (i) Concatenate two strings, (ii) reverse a string. (06 Marks)
- c. Apply Knut-Morris-Pratt (KMP) pattern matching algorithm to search the pattern "abcdabcy" in the text "abcxabcxabcdabcy". (06 Marks)

Module-2

- 3 a. Define stack data structure and give the ADT for stack. Write C functions for push() and pop() operations. (08 Marks)
- b. Convert the given infix expressions to postfix and prefix expression.
 (i) $(a+b)*d + c*(g*h) + i$
 (ii) $((a/(b-c+d)) * (e-f) * g)$ (06 Marks)
- c. Write an algorithm for evaluation of postfix expression. Trace the same for the expression $ab/c - de * ac * t$ where $a = 6, b = 3, c = 1, d = 2, e = 4$. (06 Marks)

OR

- 4 a. Define recursion. Write recursive functions for the following :
 (i) Tower of Hanoi (ii) Factorial of a give number. (07 Marks)
- b. Write C functions for insertcq() and deletcq() operations on a circular queue. (05 Marks)
- c. Explain in detail multiple stacks. with relevant functions in C. (08 Marks)

Module-3

- 5 a. Define linked lists. Explain in detail, the primitive operations performed on Supply Linked List (SLL). List the different types of linked lists. (12 Marks)
- b. Write C functions for the following operations on Doubly Linked List (DLL).
 (i) Concatenation of two DLL.
 (ii) Search the DLL for the given key element. (08 Marks)

OR

- 6 a. Write a C program to implement linked stacks. (08 Marks)
- b. Write an algorithm to add 2 polynomials using circular simply linked list (SLL). And also represent the given polynomial using CSLI.
 $P(x, y, z) = 6x^2y^2z - 4yz^3 + 3x^3yz + 2xy^2z - 2xyz^3$ (08 Marks)
- c. For the given sparse matrix give the linked list representation.

$$A = \begin{bmatrix} 0 & 0 & 4 & 0 & 0 \\ 6 & 5 & 0 & 0 & 0 \\ 0 & 3 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix}$$

(04 Marks)

Module-4

- 7 a. Define tree data structure. Represent the tree given in Fig.Q7(a) using (i) List representation (ii) Left-Child Right-Sibling representation (iii) Degree two or Binary tree representation. (08 Marks)

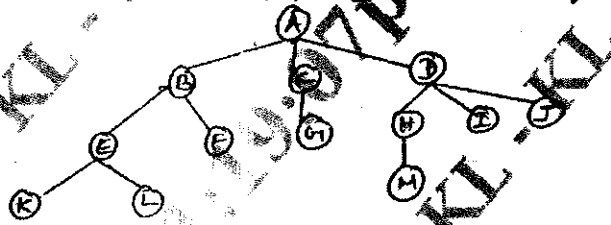


Fig.Q7(a)

- b. Write recursive C functions for in-order, pre-order, post-order traversals of binary tree (BT). Also give the 3 traversals for the BT shown in Fig.Q7(b). (12 Marks)

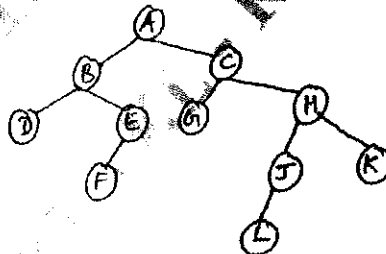


Fig.Q7(b)

OR

- 8 a. Define Binary Search Tree (BST). Construct BST for the element step-by-step. 100, 85, 45, 55, 110, 20, 70, 65, 113, 145, 132, 96 (08 Marks)
- b. Define threaded binary trees. Given in-order sequence: DJGBHEAFKIC and post-order sequence: JGDHEBKIFCA, construct BT for the same. (08 Marks)
- c. Write an algorithm for deleting a key element from BST. (04 Marks)

Module-5

- 9 a. Define the terminologies with example for graph data structure.
 (i) Graph (ii) Multigraph (iii) Complete graph. (06 Marks)
- b. Give the adjacency matrix and adjacency list representation for the weighted graph given in Fig.Q9(b). (06 Marks)

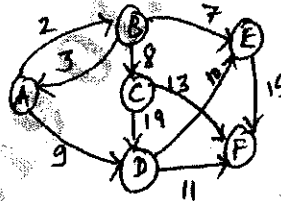


Fig.Q9(b)

- c. Write an algorithm for BFS and DFS graph traversal methods. (08 Marks)

OR

- 10 a. Apply insertion sort technique for the following elements : 77, 33, 44, 11, 88, 22, 66, 55. (08 Marks)
- b. Explain Hashing and collision. What are the methods used to resolve collision. (08 Marks)
- c. What are the basic operations that can be performed on a file? List the methods used for file organization (any 2). (04 Marks)

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17CS34

Third Semester B.E. Degree Examination, June/July 2019 Computer Organization

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing
ONE full question from each module.

Module-1

- 1 a. Write the basic performance equation. Explain the role of each of the parameters in the equation of the performance of the computer. (04 Marks)
- b. Draw and explain the connections between the processor and the main memory. (08 Marks)
- c. Write a program to evaluate the arithmetic statement $Y = (A + B) * (C + D)$ using three – address, two-address, one-address and zero – address instructions. (08 Marks)

OR

- 2 a. What is an addressing mode? Explain any four addressing modes with examples. (08 Marks)
- b. Explain the concept of stack frames, when subroutines are nested. (06 Marks)
- c. Explain the shift and rotate operations with examples. (06 Marks)

Module-2

- 3 a. Give comparison between memory mapped I/O and I/O mapped I/O. (04 Marks)
- b. Explain the following methods of handling interrupts from multiple devices.
 - i) Interrupt nesting /priority structure
 - ii) Daisy chain method.(08 Marks)
- c. What is bus arbitration? Explain distributed arbitration with a neat diagram. (08 Marks)

OR

- 4 a. Draw neat timing diagrams and explain:
 - i) Multicycle synchronous bus transfer for a read operation.
 - ii) Asynchronous bus transfer for a write operation.(12 Marks)
- b. Explain the following with respect to USB.
 - i) USB architecture
 - ii) USB addressing.(08 Marks)

Module-3

- 5 a. With a neat diagram, explain the internal organization of a $2M \times 8$ dynamic memory chip. (08 Marks)
- b. Distinguish between SRAM and DRAM. (04 Marks)
- c. Describe any two mapping functions in cache. (08 Marks)

OR

- 6 a. What is virtual memory? With a diagram, explain how virtual memory address is translated? (08 Marks)
- b. Define the following :
 - i) Memory latency
 - ii) Memory bandwidth
 - iii) Hit-rate
 - iv) Miss-penalty.(04 Marks)
- c. Describe the working principle of a typical magnetic disk. (08 Marks)

Module-4

- 7 a. Convert the following pairs of decimal numbers to 5-bit signed 2's complement binary numbers and add them. State whether overflow has occurred.
 i) -5 and 7 ii) -10 and -13 iii) -14 and 11. (06 Marks)
- b. Draw 4-bit carry-look ahead adder and explain. (06 Marks)
- c. Explain Booth's algorithm, multiply +15 and -6 using Booth's multiplication. (08 Marks)

OR

- 8 a. Explain the concept of carry-save addition for the multiplication operation $M \times Q = P$ for 4-bit operands, with diagram and suitable example. (08 Marks)
- b. Explain IEEE standard for floating – point numbers. (06 Marks)
- c. Perform the non-restoring division for $8 \div 3$ by showing all the steps. (06 Marks)

Module-5

- 9 a. Draw and explain multiple bus organization of CPU. And write the control sequence for the instruction Add R₄, R₅, B₆ for the multiple bus organization. (10 Marks)
- b. Explain with block diagram the basic organization of a micro programmed control unit. (10 Marks)

OR

- 10 a. With block diagram, explain the working of a microwave oven. (10 Marks)
- b. Explain the structure of general-purpose multiprocessors with diagrams. (10 Marks)

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17CS35

Third Semester B.E. Degree Examination, June/July 2019 UNIX and Shell Programming

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing
ONE full question from each module.**

Module-1

- 1 a. With a neat diagram, explain the architecture of UNIX operating system. (08 Marks)
- b. Differentiate between internal and external commands in UNIX with suitable examples. (05 Marks)
- c. Write down the key combinations for managing the non-uniform behavior of key board and terminal for the following :
 - i) Backspacing doesn't work
 - ii) Killing a line
 - iii) Interrupting a command
 - iv) Terminating commands input
 - v) Keyboard is locked
 - vi) [Enter] key doesn't work
 - vii) Terminal behaves in erratic manner (command). (07 Marks)

OR

- 2 a. Explain the salient features of UNIX operating system. (08 Marks)
- b. Differentiate between 'more' and 'less' page programs in UNIX. (04 Marks)
- c. List and describe the mandatory and optional sections of man page in UNIX operating system. (08 Marks)

Module-2

- 3 a. Illustrate with a neat diagram typical UNIX file system and explain different types of files supported in UNIX. (08 Marks)
- b. Assume you are in /home/Kumar, which of these commands will work when executed in sequence? Explain the proper reasons.
 mkdir a/b/c → mkdir a/a/b
 mkdir a/a/b/a/b/c → rmdir a/b/c → rmdir a/a/b → mkdir a/p a/q a/p/r
 Draw the final tree structure for directory 'a'. (07 Marks)
- c. Explain the following commands with an example. i) cd ii) pwd iv) rmdir v) wc. (05 Marks)

OR

- 4 a. Which command is used for listing file attributes? Explain the significance of each field in the output. (08 Marks)
- b. Explain the following commands with an example for each.
 i) cp ii) rm iii) mv iv) cat. (04 Marks)
- c. Current file permissions of a regular file "unix" are rw__w__x. Write chmod expressions required to change it to the following :
 i) wxrwxr_x ii) ___r_xrw iii) rwx__x___ iv) r___wx___
 Using both relative and absolute methods of assigning permissions. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Explain the three modes of vi. Indicate clearly how can you switch from one mode to another. Explain the following input mode commands : i, I, a, A, r, R, o, O, s, S. (10 Marks)
- b. Explain what these wild-card pattern match
 i) [A – Z]???? * ii) *[^ 0 – 9]* iii) *.[!t][!x][!t] (06 Marks)
- c. Explain the navigation keys for the following types of navigations in vi editor.
 i) Movement in four directions
 ii) Word navigation. (04 Marks)

OR

- 6 a. With suitable examples, explain the 'grep' command with its various options. (06 Marks)
- b. Briefly explain Basic Regular Expression (BRE) and Extended Regular Expression (ERE) metacharacters. (10 Marks)
- c. Write a regular expression to match the following i) a decimal number which is non negative and floating point number ii) A valid 'C' variable. (04 Marks)

Module-4

- 7 a. Explain the following commands with an example for each. i) head ii) tail iii) cut iv) paste. (08 Marks)
- b. What is shell programming? Write a shell program to create a simple calculator which can perform basic arithmetic operations like addition, subtraction, multiplication or division, depending upon the user input. (10 Marks)
- c. Write the syntax for if-else-fi statement in shell programming. (02 Marks)

OR

- 8 a. Write a shell program to get the following details of the student. Name, age, USN and gender. Output all the details to the terminal. And also output whether the student is eligible to vote or not with suitable messages. (08 Marks)
- b. Distinguish between hard links and soft links. (04 Marks)
- c. Write and explain the syntax of 'while' and 'for' loops in shell programming. (08 Marks)

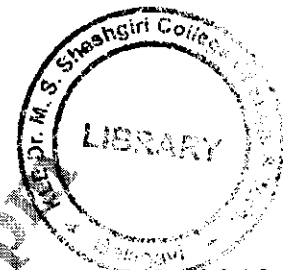
Module-5

- 9 a. Write a Perl script to determine whether the given year is a leap year or not. (08 Marks)
- b. What is the difference between a job and a process? How do you i) suspend the foreground job ii) move a suspended job to the background iii) bring back a suspended job to the foreground? (06 Marks)
- c. Explain the mechanism of process creation. (06 Marks)

OR

- 10 a. Explain the following string handling functions of PERL with example :
 i) length ii) index iii) substr iv) reverse. (08 Marks)
- b. Explain the following commands :
 i) at ii) cron iii) nice iv) nohup. (08 Marks)
- c. With suitable examples, explain 'split' and 'join' functions in PERL. (04 Marks)

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17CS36

Third Semester B.E. Degree Examination, June/July 2019
Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing
ONE full question from each module.**

Module-1

- 1 a. Define tautology. Verify that $[p \rightarrow (q \rightarrow r)] \rightarrow [(p \rightarrow q) \rightarrow (p \rightarrow r)]$ is a tautology. (06 Marks)
 b. If statement q has truth value 1, determine all truth value assignments for the primitive statements p, r, s for which the truth value of the statement :

$$(q \rightarrow [(\neg p \vee r) \wedge \neg s]) \wedge [\neg s \rightarrow (\neg r \wedge q)] \text{ is 1.}$$

(04 Marks)

- c. Establish the following logical equivalence :

$$i) p \vee q \vee (\neg p \wedge \neg q \wedge r) \Leftrightarrow p \vee q \vee r$$

$$ii) [(\neg p \vee \neg q) \rightarrow (r \wedge q \wedge r)] \Leftrightarrow p \wedge q.$$

(10 Marks)

OR

- 2 a. Establish the validity of following arguments :

$$i) (\neg p \vee \neg q) \rightarrow (r \wedge s)$$

$$ii) u \rightarrow r$$

$$r \rightarrow t$$

$$(r \wedge s) \rightarrow (p \vee t)$$

$$\neg t$$

$$q \rightarrow (u \wedge s)$$

$$\therefore p$$

$$\neg t$$

$$q$$

$$\therefore p$$

(08 Marks)

- b. Let p(x), q(x) and r(x) be the following open statements :

$$p(x) : x^2 - 7x + 10 = 0 \quad q(x) : x^2 - 2x - 3 = 0 \quad r(x) : x < 0$$

Determine truth or falsity of following statements, where universe is all integers. If a statement is false, provide a counter example.

$$i) \forall x [p(x) \rightarrow \neg r(x)]$$

$$ii) \forall x [q(x) \rightarrow r(x)]$$

$$iii) \exists x [q(x) \rightarrow r(x)]$$

$$iv) \exists x [p(x) \rightarrow r(x)]$$

(08 Marks)

- c. Prove that for all integers 'k' and 'l', if 'k' and 'l' are both even, then k + l is even and kl is even by direct proof.

(04 Marks)

Module-2

- 3 a. Define well ordering principle and prove the following by mathematical induction :

$$i) 1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$$

$$ii) 1*3 + 2*4 + 3*5 + \dots + n(n+2) = \frac{n(n+1)(2n+7)}{6}$$

(12 Marks)

- b. Find the coefficients of :

$$i. x^9 y^3 \text{ in the expansion of } (2x - 3y)^{12}$$

$$ii. a^2 b^3 c^2 d^5 \text{ in the expansion of } (a + 2b - 3c + 2d + 5)^{16}.$$

(08 Marks)

OR

- 4 a. A women has 11 close relatives and she wishes to invite 5 of them to dinner. In how many ways can she invite them in following situations,
 i. There is no restriction on the choice
 ii. Two particular persons will not attend separately
 iii. Two particular persons will not attend together (06 Marks)
- b. How many arrangements are there for all letters in word SOCIOLOGICAL? In how many of these arrangements all vowels are adjacent? (06 Marks)
- c. For the Fibonacci sequence F_0, F_1, F_2, \dots prove that $F_n = \frac{1}{\sqrt{5}} \left[\left(\frac{1+\sqrt{5}}{2} \right)^n - \left(\frac{1-\sqrt{5}}{2} \right)^n \right]$. (08 Marks)

Module-3

- 5 a. Let $A = \{1, 2, 3, 4\}$ and $B = \{1, 2, 3, 4, 5, 6\}$.
 i. How many functions are there from A to B?
 ii. How many of these are one to one?
 iii. How many are onto?
 iv. How many functions are there from B to A?
 v. How many of these are onto?
 vi. How many are one to one? (06 Marks)
- b. A computer operator is given a magnetic tape that contains 500,000 words of four or fewer lowercase letters. Can it be that the 500,000 words are all distinct? (06 Marks)
- c. Let $f, g, h : \mathbb{R} \rightarrow \mathbb{R}$ where $f(x) = x^2$, $g(x) = x^5$ and $h(x) = \sqrt{x^2 + 2}$. Show that $(hog) \circ f = ho(gof)$. (08 Marks)

OR

- 6 a. Let $A = \{1, 2, 3, 6, 9, 18\}$ and define R on A by xRy if "x divides y", Draw the Hasse diagram for the poset (A, R). Also write the matrix of relation. (08 Marks)
- b. Consider Poset whose Hasse diagram is given below. Consider $B = \{3, 4, 5\}$. Find upper and lower bounds of B, least upper bound and greatest lower bound of B. (04 Marks)
 (Ref. Fig.Q6(b)).

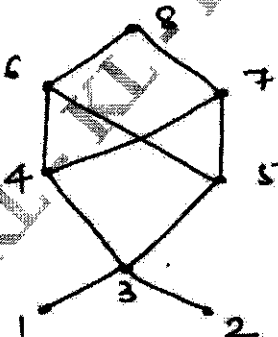
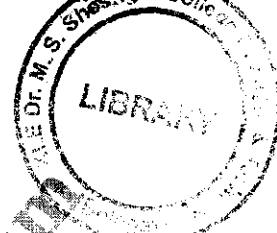


Fig.Q6(b)

- c. Let $A = \{1, 2, 3, 4, 5\} \times \{1, 2, 3, 4, 5\}$ and define R on A by $(x_1, y_1) R (x_2, y_2)$ if $x_1 + y_1 = x_2 + y_2$.
 i. Verify that R is an equivalence relation on A
 ii. Determine equivalence classes $[(1, 3)]$, $[(2, 4)]$ and $[(1, 1)]$
 iii. Determine partition of A induced by R. (08 Marks)

**Module-4**

- 7 a. In how many ways can the 26 letters of English alphabet be permuted so that none of the patterns CAR, DOG, PUN or BYTE occurs? (08 Marks)
- b. There are eight letters to eight different people to be placed in eight different addressed envelopes. Find the number of ways of doing this so that atleast one letter gets to right person. (04 Marks)
- c. Four persons P_1, P_2, P_3, P_4 who arrive late for a dinner party find that only one chair at each of five table T_1, T_2, T_3, T_4 and T_5 is vacant. P_1 will not sit at T_1 or T_2 , P_2 will not sit at T_2 , P_3 will not sit at T_3 or T_4 and P_4 will not sit at T_4 or T_5 . Find the number of ways they can occupy the vacant chairs. (08 Marks)

OR

- 8 a. Find the recurrence relation and the initial condition for the sequence 0, 2, 6, 12, 20, 30, 42, Hence find the general term of the sequence. (10 Marks)
- b. If $a_0 = 0, a_1 = 1, a_2 = 4$ and $a_3 = 37$ satisfy the recurrence relation $a_{n+2} + ba_{n+1} + ca_n = 0$ for $n \geq 0$, determine the constants b and c and then solve the relation for a_n . (10 Marks)

Module-5

- 9 a. Merge sort the list -1, 7, 4, 11, 5, -8, 15, -3, -2, 6, 10, 3. (06 Marks)
- b. Determine whether the following graphs are isomorphic or not. (06 Marks)

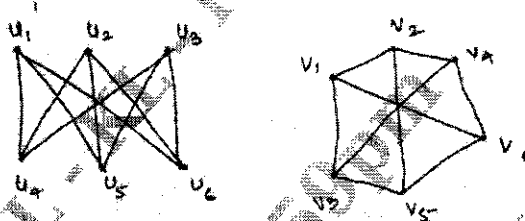


Fig.Q9(b)

- c. Define the following with an example to each.
- i) Simple graph ii) Complete graph iii) Regular graph iv) Spanning sub graph v) Induced subgraph vi) Complete Bipartite graph vii) Tree viii) Complement of graph. (08 Marks)

OR

- 10 a. Define trail, circuit, path, cycle. In the graph shown below determine : [Ref.Q10(a)]
- i. a walk from b to d that is not a trail
- ii. b-d trail that is not a path
- iii. a path from b to d
- iv. a closed walk from b to b that is not a circuit
- v. a circuit from b to b that is not cycle
- vi. a cycle form b to b. (10 Marks)

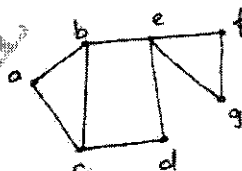


Fig.Q10(a)

- b. Define optimal tree and construct an optimal tree for a given set of weights {4, 15, 25, 5, 8, 16}. Hence find the weight of optimal tree. (06 Marks)
- c. Prove that in a graph. The sum of degrees of all vertices is an even number and is equal to twice the number of edges in the graph. (04 Marks)

CBCS SCHEME

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17MAT41

Fourth Semester B.E. Degree Examination, June/July 2019 Engineering Mathematics - IV

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. If $y' + y + 2x = 0$, $y(0) = -1$ then find $y(0.1)$ by using Taylor's series method. Consider upto third order derivative term. (06 Marks)
- b. Find $y(0.2)$ by using modified Euler's method, given that $y' = x + y$, $y(0) = 1$. Take $h = 0.1$ and carry out two modifications at each step. (07 Marks)
- c. If $y' = \frac{1}{x+y}$, $y(0) = 2$, $y(0.2) = 2.0933$, $y(0.4) = 2.1755$, $y(0.6) = 2.2493$ then find $y(0.8)$ by Milne's method. (07 Marks)

OR

- 2 a. Use Taylor's series method to find $y(0.1)$ from $y' = 3x + y^2$, $y(0) = 1$. Consider upto fourth derivative term. (06 Marks)
- b. Use Runge - Kutta method to find $y(0.1)$ from $y' = x^2 + y$, $y(0) = -1$. (07 Marks)
- c. Use Adam - Bashforth method to find $y(0.4)$ from $y' = \frac{1}{2}xy$, $y(0) = 1$, $y(0.1) = 1.0025$, $y(0.2) = 1.0101$, $y(0.3) = 1.0228$. (07 Marks)

Module-2

- 3 a. Express $x^3 - 5x^2 + 6x + 1$ in terms of Legendre polynomials. (06 Marks)
- b. Find $y(0.1)$, by using Runge - Kutta method, given that $y'' + xy' + y = 0$, $y(0) = 1$, $y'(0) = 0$. (07 Marks)
- c. Solve Bessel's operation leading to $J_n(x)$. (07 Marks)

OR

- 4 a. Prove that $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$. (06 Marks)
- b. Find $y(0.4)$ by using Milne's method, given that $y(0) = 1$, $y'(0) = 1$, $y(0.1) = 1.0998$, $y'(0.1) = 0.9946$, $y(0.2) = 1.1987$, $y'(0.2) = 0.9773$, $y(0.3) = 1.2955$, $y'(0.3) = 0.946$. (07 Marks)
- c. State and prove Rodrigue's formula. (07 Marks)

Module-3

- 5 a. Derive Cauchy - Riemann equations in Cartesian coordinates. (06 Marks)
- b. Find an analytic function $f(z) = u + iv$ in terms of z , given that $u = e^{2x}(x \cos 2y - y \sin 2y)$. (07 Marks)
- c. Evaluate $\int_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$, c is $|z| = 3$ by residue theorem. (07 Marks)

OR

- 6 a. Prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |f(z)|^2 = 4|f'(z)|^2$. (06 Marks)
- b. Discuss the transformation $W = Z^2$. (07 Marks)
- c. Find a bilinear transformation that maps the points ∞, i, o in Z - plane into $-1, -i, 1$ in W - plane respectively. (07 Marks)

Module-4

- 7 a. In a sampling a large number of parts manufactured by a machine, the mean number of defectives in a sample of 20 is 2, out of 1000 such samples, how many would be expected to contain atleast 3 defective parts? (06 Marks)
- b. If X is a normal variate with mean 30 and standard deviation 5, find the probabilities that
 i) $26 \leq X \leq 40$ ii) $X > 45$ iii) $|X - 30| > 5$
 Given that $\phi(0.8) = 0.288$, $\phi(2.0) = 0.4772$, $\phi(3) = 0.4987$, $\phi(1) = 0.3413$. (07 Marks)
- c. The joint density function of two continuous random variables X and Y is given by

$$f(x, y) = \begin{cases} Kxy, & 0 \leq x \leq 4, 1 < y < 5 \\ 0, & \text{otherwise} \end{cases}$$

 Find i) K ii) $E(x)$ iii) $E(2x + 3y)$. (07 Marks)

OR

- 8 a. Derive mean and standard deviation of the Poisson distribution. (06 Marks)
- b. The joint probability distribution for two random variables X and Y as follows :

X \ Y	-2	-1	4	5
1	0.1	0.2	0	0.3
2	0.2	0.1	0.3	0

- Find i) Expectations of X, Y, XY ii) SD of X and Y iii) Covariance of X, Y
 iv) Correlation of X and Y . (07 Marks)
- c. In a certain town the duration of shower has mean 5 minutes. What is the probability that shower will last for i) 10 minutes or more ii) Less than 10 minutes iii) Between 10 and 12 minutes. (07 Marks)

Module-5

- 9 a. A group of boys and girls were given in Intelligence test. The mean score, SD score and numbers in each group are as follows : (06 Marks)

	Boys	Girls
Mean	74	70
SD	8	10
X	12	10

Is the difference between the means of the two groups significant at 5% level of significance? Given that $t_{0.05} = 2.086$ for 20 d.f.

- b. The following table gives the number of accidents that take place in an industry during various days of the week. Test if accidents are uniformly distributed over the week.

Day	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents	14	18	12	11	15	14

Given that $X^2 = 11.09$ at 5% level for 5 d.f.

(07 Marks)



17MAT41

- c. Find the unique fixed probability vector for the regular stochastic matrix.

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 1/6 & 1/2 & 1/3 \\ 0 & 2/3 & 1/3 \end{bmatrix}$$

(07 Marks)

OR

- 10 a. Define the following terms :

- i) Type I error and type II error.
- ii) Transient state.
- iii) Absorbing state.

(06 Marks)

- b. A certain stimulus administered to each of the 12 patients resulted in the following increases of blood pressure : 5, 2, 8, -1, 3, 0, -2, 1, 5, 0, 4, 6. Can it be concluded that the stimulus will be general be accompanied by an increase in blood pressure. Given that $t_{0.05} = 2.2$ for 11 d.f.

(07 Marks)

- c. If $P = \begin{bmatrix} 0 & 2/3 & 1/3 \\ 1/2 & 0 & 1/2 \\ 1/2 & 1/2 & 0 \end{bmatrix}$. Find the corresponding stationary probability vector. (07 Marks)

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Fourth Semester B.E. Degree Examination, June/July 2019
Additional Mathematics – II

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find the rank of the matrix $\begin{bmatrix} 2 & 3 & 4 \\ -1 & 2 & 3 \\ 1 & 5 & 7 \end{bmatrix}$ by elementary row operations. (08 Marks)
- b. Test for consistency and solve $x + y + z = 6$, $x - y + 2z = 5$, $3x + y + z = 8$. (06 Marks)
- c. Solve the system of equations by Gauss elimination method:
 $x + y + z = 9$ $x + 2y + 3z = 8$ $2x + y + z = 3$ (06 Marks)

OR

- 2 a. Find all the eigen values and the corresponding eigen vectors of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ (08 Marks)
- b. Solve by Gauss elimination method $2x_1 + x_2 - 2x_3 = 5$, $x_1 - 2x_2 + 3x_3 = 2$, $3x_1 - x_2 + 4x_3 = 4$. (06 Marks)
- c. If $A = \begin{bmatrix} 2 & -3 \\ 3 & 4 \end{bmatrix}$ find A^{-1} by Cayley Hamilton theorem. (06 Marks)

Module-2

- 3 a. Solve $\frac{d^3y}{dx^3} - 2\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 8y = 0$. (08 Marks)
- b. Solve $6\frac{d^2y}{dx^2} + 17\frac{dy}{dx} + 12y = e^{-x}$. (06 Marks)
- c. Solve $y'' - 4y' + 13y = \cos 2x$. (06 Marks)

OR

- 4 a. Solve $\frac{d^3y}{dx^3} + 6\frac{d^2y}{dx^2} + 11\frac{dy}{dx} + 6y = 0$. (08 Marks)
- b. Solve $y'' + 2y' + y = \frac{e^{\frac{x}{2}} + e^{-\frac{x}{2}}}{2}$. (06 Marks)
- c. Solve $y'' + 2y' + y = 2x + x^2$. (06 Marks)

Module-3

- 5 a. Find $L[\cosh at]$. (08 Marks)
- b. Find $L[e^{-2t} \sinh 4t]$. (06 Marks)
- c. Find $R\{\sin 2t\}$. (06 Marks)

OR

- 6 a. Show that $\int_0^{\infty} t^3 e^{-at} \sin t dt = 0$. (08 Marks)
- b. If $f(t) = t^2$, $0 < t < 2$ and $f(t+2) = f(t)$ for $t > 2$, find $L[f(t)]$. (06 Marks)
- c. Express $f(t) = \begin{cases} t, & 0 < t < 4 \\ 5, & t > 4 \end{cases}$ in terms of unit step function and hence find their Laplace Transforms. (06 Marks)

Module-4

- 7 a. Find the inverse Laplace Transform of $\frac{3}{s^2} + \frac{2e^{-s}}{s^3} - \frac{3e^{-2s}}{s}$. (08 Marks)
- b. Find $L^{-1}\left[\frac{s^3 + 6s^2 + 12s + 8}{s^6}\right]$. (06 Marks)
- c. Find the inverse Laplace Transform of $\frac{s+5}{s^2 - 6s + 13}$. (06 Marks)

OR

- 8 a. Solve by using Laplace Transform $\frac{d^2 y}{dt^2} + k^2 y = 0$, given that $y(0) = 2$, $y'(0) = 0$. (08 Marks)
- b. Find inverse Laplace Transform of $\frac{1}{(s+1)(s+2)(s+3)}$. (06 Marks)
- c. Find $L^{-1}\left[\frac{s+1}{s^2 + 6s + 9}\right]$. (06 Marks)

Module-5

- 9 a. Find the probability that a leap year selected at random will contain 53 Sundays. (08 Marks)
- b. A six faced die in which the numbers 1 to 6 are marked is thrown. Find the probability of (i) 3 (ii) an odd number coming up. (06 Marks)
- c. State and prove Bayes's theorem. (06 Marks)

OR

- 10 a. A problem is given to three students A, B, C whose chances of solving it are $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$ respectively. Find the probability that the problem is solved. (08 Marks)
- b. For any three events A, B, C, prove that $P\{(A \cup B)/C\} = P(A/C) + P(B/C) - P\{(A \cap B)/C\}$. (06 Marks)
- c. Three machines A, B and C produce respectively 60%, 30% and 10% of the total number of items of a factory. The percentages of defective output of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found defective. Find the probability that the item was produced by machine C. (06 Marks)

CBCS SCHEME



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17CS42

Fourth Semester B.E. Degree Examination, June/July 2019 Object Oriented Concepts

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the various features of OOC. (08 Marks)
b. What is a constructor? Mention its types. Explain the parameterized constructor with a suitable code. (08 Marks)
c. Give the difference between procedure oriented programming and object oriented programming. (04 Marks)

OR

- 2 a. What is an inline function? Write a C++ function to find the maximum of 2 numbers using inline. (08 Marks)
b. Why friend function is required? Write a program to add two numbers using friend function. (08 Marks)
c. Write short note on function overloading. (04 Marks)

Module-2

- 3 a. List and explain the Java buzzwords. (08 Marks)
b. Describe the concept of bytecode. (04 Marks)
c. Develop the program to calculate the average among the elements {4, 8, 10, 12} using foreach in java. How foreach is different from for? (08 Marks)

OR

- 4 a. List the different types of operators. Explain any three. (08 Marks)
b. What is an array? List the types and explain any one with a suitable code. (06 Marks)
c. Explain switch case with an example. (06 Marks)

Module-3

- 5 a. Explain the packages in Java with an example. (08 Marks)
b. Explain the interfaces in java using suitable code. (08 Marks)
c. Write short notes on "this" keyword with an example. (04 Marks)

OR

- 6 a. Explain exception handling with a suitable code. (08 Marks)
b. Explain the java garbage collector. (08 Marks)
c. Write short notes on "super" keyword, with an example. (04 Marks)

Module-4

- 7 a. Explain the concepts of multithreading in Java. Explain the two ways of making class threadable with examples. (10 Marks)
b. With a syntax, explain isAlive() and join() with suitable program. (10 Marks)

OR

- 8 a. Write short notes on Event Listener interface and explain any two interfaces with syntax. (08 Marks)
b. Write short notes on Event class and explain any two with syntax. (08 Marks)
c. How inner classes are used in Java? Explain. (04 Marks)

Module-5

- 9 a. What is an applet? Explain the life cycle of an applet. (10 Marks)
b. Explain passing parameters in Applets. (10 Marks)

OR

- 10 Explain the following with a suitable code:

- i) JLabel
- ii) JTextField
- iii) JList
- iv) JTable.

(20 Marks)

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Fourth Semester B.E. Degree Examination, June/July 2019

Design and Analysis of Algorithms

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Design an algorithm to search an element in a array using sequential search. Discuss the worst case, best case and average case efficiency of this algorithm. (08 Marks)
- b. Discuss adjacency matrix and adjacency list representation of a graph with suitable example. (06 Marks)
- c. Give the recursive algorithm to solve towers of Hanoi problem. Show that the efficiency of this algorithm is exponential. (06 Marks)

OR

- 2 a. Give the general plan for analyzing time efficiency of non recursive algorithms. Derive the worst case analysis for the algorithm to check whether all the elements in a given array are distinct. (08 Marks)
- b. List and define any three asymptotic notations. What are the various basic asymptotic efficiency classes? (06 Marks)
- c. Explain the following types of problems:
(i) Combinatorial problems (ii) Graph problems. (06 Marks)

Module-2

- 3 a. Write an algorithm to sort 'n' numbers using Quick sort. Trace the algorithm to sort the following list in ascending order.
80 60 70 40 10 30 50 20 (08 Marks)
- b. Discuss general divide and conquer technique with control abstraction and recurrence relation. (06 Marks)
- c. Apply DFS based algorithm and source removal method to find the topological sequence for the graph shown in Fig.Q3(c). (06 Marks)

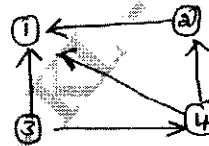


Fig.Q3(c)

OR

- 4 a. Apply Strassen's matrix multiplication to multiply following matrices. Discuss how this method is better than direct matrix multiplication method.

$$\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix} \times \begin{bmatrix} 2 & 5 \\ 1 & 6 \end{bmatrix}$$
(08 Marks)
- b. Write recursive algorithm to find maximum and minimum element in an array. (06 Marks)
- c. Write an algorithm to sort 'n' number using merge sort. (06 Marks)

Module-3

- 5 a. Write an algorithm to solve knapsack problem using Greedy technique. Find the optimal solution to the knapsack instance $n = 7$, $m = 15$
 $(P_1, P_2, \dots, P_7) = (10, 5, 15, 7, 6, 18, 3)$
 $(W_1, W_2, \dots, W_7) = (2, 3, 5, 7, 1, 4, 1)$ (10 Marks)
- b. Apply Prim's algorithm and Kruskal's method to find the minimum cost spanning tree to the graph shown in Fig.Q5(b). (10 Marks)

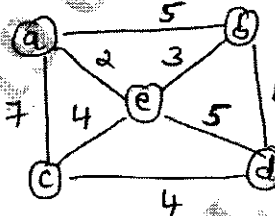


Fig.Q5(b)

OR

- 6 a. Write an algorithm to solve single source shortest path problem. Apply the algorithm to the graph shown in Fig.Q6(a) by considering 'a' as source. (10 Marks)

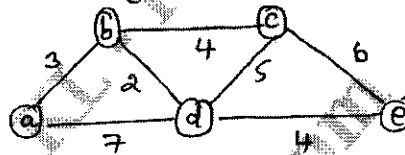


Fig.Q6(a)

- b. Define heap. Write bottom-up heap construction algorithm. Construct heap for the list 1, 8, 6, 5, 3, 7, 4 using bottom-up algorithm and successive key insertion method. (10 Marks)

Module-4

- 7 a. Define transitive closure of a directed graph. Find the transitive closure matrix for the graph whose adjacency matrix is given. (10 Marks)

$$\begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$

- b. Find the optimal tour for salesperson using dynamic programming technique. The directed graph is shown in Fig.Q7(b). (10 Marks)

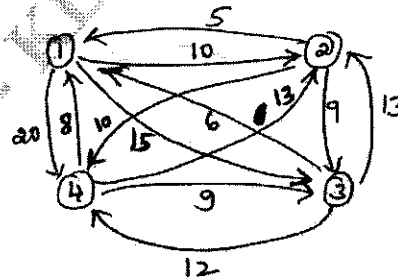


Fig.Q7(b)

OR

- 8 a. Write an algorithm to construct optimal binary search tree for the following data:

Key	A	B	C	D
Probability	0.1	0.2	0.4	0.3

(10 Marks)

- b. Apply the bottom-up dynamic programming algorithm to the following instance of the knapsack problem. Knapsack capacity $W = 10$.

Item	Weight	Value
1	7	42
2	3	12
3	4	40
4	5	25

(10 Marks)

Module-5

- 9 a. Construct state-space tree for solving four queens problem using backtracking. (06 Marks)
 b. Discuss graph coloring problem. Find different solutions for 4 nodes and all possible 3 coloring problem. (06 Marks)
 c. Write a note on: (i) Non deterministic algorithms. (ii) LC branch and bound solution to solve 0/1 knapsack problem. (08 Marks)

OR

- 10 a. What are the two additional items required by Branch and Bound technique, compared with backtracking. Solve the following assignment problem using branch and bound technique, whose cost matrix for assigning four jobs to four persons are given

9	2	7	8
6	4	3	7
5	8	1	8
7	6	9	4

(10 Marks)

- b. Discuss the following :
 (i) Subset sum problem
 (ii) NP hard and NP complete classes.

(10 Marks)



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17CS44

Fourth Semester B.E. Degree Examination, June/July 2019 Microprocessors and Microcontrollers

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat block diagram explain internal architecture of 8086 microprocessor. (08 Marks)
- b. Explain the following with respect to 8086 microprocessor: (06 Marks)
 - (i) Memory segmentation
 - (ii) Flag Register
- c. Calculate the physical address in following instructions if CS = 4000H, DS = 2000H, SS = 1000H, ES = 3000H, BX = 0022H, BP = 1234H. (06 Marks)
 - (i) MOV AL, [BX]
 - (ii) MOV CL, [BP]
 - (iii) MOV ES : AX, [BX + 05]

OR

- 2 a. What is an addressing mode? With example explain different addressing modes of 8086. (08 Marks)
- b. What is stack? Explain the working of PUSH and POP instructions. (06 Marks)
- c. What is an assembler directive? With example explain following assembler directives: (06 Marks)
 - (i) assume
 - (ii) org
 - (iii) db
 - (iv) equ

Module-2

- 3 a. Differentiate between procedure and macro. Write a program using macros that clears the screen, sets the cursor at the centre of screen and display the message "Journey Towards Excellence". (08 Marks)
- b. Explain shift and rotate instructions of 8086. (06 Marks)
- c. Write a program to count number of zeros and ones in a given byte. (06 Marks)

OR

- 4 a. What is an interrupt vector table? Explain the steps a 8086 will take when it responds to an interrupt. (08 Marks)
- b. With example explain the following instructions of 8086. (06 Marks)
 - (i) MUL
 - (ii) DAA
 - (iii) CWD
 - (iv) STD
- c. Write a program to find the value of $x^2 + 2x + 5$, where x is 8 bit input hex number. (06 Marks)

Module-3

- 5 a. What is data integrity? Explain the methods used for data integrity in Ram and ROM. Also find the checksum byte for 34H, 54H, 7FH, 11H, E6H and 99H. (08 Marks)
- b. Explain how signed numbers are represented in 8086. Also explain the significance of overflow flag. (06 Marks)
- c. Explain IN and OUT instructions. Show the design of an output port with an I/O address of 99H using 74LS373. (06 Marks)

OR

- 6 a. Differentiate between memory mapped I/O and I/O mapped I/O. Explain the control word format of 8255. (08 Marks)
 b. With example explain any five string manipulation instructions of 8086. (06 Marks)
 c. Write a program to find average of n different temperatures. (06 Marks)

Module-4

- 7 a. Differentiate between RISC and CISC. (06 Marks)
 b. With a neat block diagram explain ARM core data flow model. (06 Marks)
 c. Explain the different operating modes of Arm. Also explain the complete ARM register set. (08 Marks)

OR

- 8 a. With a block diagram explain typical ARM based embedded system. (06 Marks)
 b. With the help of bit layout diagram explain current program status register of ARM. (06 Marks)
 c. Explain the concepts of core Extensions and Pipeline in ARM processor. (08 Marks)

Module-5

- 9 a. With example explain MOV and MVN instructions of ARM. (06 Marks)
 b. Explain the different barrel shifter operations. (06 Marks)
 c. Explain the arithmetic instructions of ARM. (08 Marks)

OR

- 10 a. Explain multiply, branch and load store instructions of ARM. (10 Marks)
 b. With example explain SWAP instruction of ARM. (04 Marks)
 c. Write ARM assembly language program to add two 32 bit numbers. (06 Marks)

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Fourth Semester B.E. Degree Examination, June/July 2019 Software Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define software. Explain essential attributes of good software. (08 Marks)
b. Explain different types of application software's. (06 Marks)
c. Explain Bohem's spiral model. (06 Marks)

OR

- 2 a. Explain a general model of the design process with block diagram. (06 Marks)
b. Explain the structure of requirement document. (08 Marks)
c. Explain requirement elicitation and analysis process. (06 Marks)

Module-2

- 3 a. Explain context models with an example. (08 Marks)
b. Explain: i) Generalization ii) Aggregation. (06 Marks)
c. Draw state diagram for working of microwave oven. (06 Marks)

OR

- 4 a. Explain Rational Unified Process (RUP). (08 Marks)
b. Draw UML state diagram for weather station system. (08 Marks)
c. Discuss in short about open source licensing. (04 Marks)

Module-3

- 5 a. Define testing. Explain interface testing. (08 Marks)
b. Discuss TDD (Test Driven Development). (06 Marks)
c. Explain user testing. (06 Marks)

OR

- 6 a. Define software evolution. Explain software evolution process with block diagram. (08 Marks)
b. Discuss Lehman's laws of program evolution dynamics. (06 Marks)
c. Discuss four strategic options for legacy system management. (06 Marks)

Module-4

- 7 a. Discuss factors affecting software pricing. (10 Marks)
b. Explain project scheduling process. (10 Marks)

OR

- 8 a. Discuss software quality attributes. (08 Marks)
b. Discuss the various inspection checks in program inspection. (06 Marks)
c. Discuss the relationships between internal and external quality attributes. (06 Marks)

Module-5

- 9 a. Explain two ways of coping with change and changing requirements. (10 Marks)
b. Explain extreme programming practices. (10 Marks)

OR

- 10 a. Explain the extreme programming release cycle. (08 Marks)
b. Write short note on pair programming. (06 Marks)
c. Explain SCRUM process. (06 Marks)

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Fourth Semester B.E. Degree Examination, June/July 2019 Data Communications

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing
ONE full question from each module.

Module-1

- 1 a. Explain OSI model with neat diagram. (08 Marks)
b. With neat diagram, explain the four basic topologies. (08 Marks)
c. Write in brief the FIVE components of a data communication. (04 Marks)

OR

- 2 a. What is data communication? Explain different forms of data representation. (08 Marks)
b. Describe simplex, half duplex and full duplex with respect to data communication. (07 Marks)
c. What are the factors that determine whether a communication is LAN or WAN? (05 Marks)

Module-2

- 3 a. Name 3 types of transmission impairment. (08 Marks)
b. List the characteristics of virtual circuit networks. (04 Marks)
c. Explain: i) Bandwidth ii) Throughput iii) Latency (08 Marks)

OR

- 4 a. Explain digital to digital conversion. (07 Marks)
b. What do you mean by amplitude shift keying, Frequency shift keying and phase shift keying? (06 Marks)
c. Write short notes on:
i) Shannon capacity and
ii) Nyquist theorem in communication. (07 Marks)

Module-3

- 5 a. How does a single bit error differ from burst error? (04 Marks)
b. Describe channelizing protocol. (07 Marks)
c. Explain why collision is an issue in Random Access Protocol but not in Controlled Access Protocol? (09 Marks)

OR

- 6 a. Explain 10 Gigabit Ethernet implementation. (08 Marks)
b. What are the advantages of dividing Ethernet LAN with bridge? (06 Marks)
c. Define spread spectrum technique used by bluetooth. (06 Marks)

Module-4

- 7 a. Explain the advantages of IPV6 compared to IPV4. (06 Marks)
b. Describe 3 security issues that are applicable to IP protocol. (08 Marks)
c. Which protocol is the carrier of the agent advertisement and solicitations messages? (06 Marks)

OR

- 8 a. What are the different types of extension headers in IPV4? Explain. (06 Marks)
b. Explain the benefits of renumbering and auto configuration. (07 Marks)
c. Distinguish between compatible and mapped address and explain their applications. (07 Marks)

Module-5

- 9 a. Explain various components of cellular system with neat diagram. (06 Marks)
b. What is mobile IP? Explain three phases for communication in Mobile IP. (08 Marks)
c. Explain various ICMPV6 messages. (06 Marks)

OR

- 10 a. Describe three ways to make transition from IPV4 to IPV6. (06 Marks)
b. What is cellular telephony? Explain third generation of 3G of cellular telephony. (06 Marks)
c. Explain the three categories of satellites. (08 Marks)

CBCS SCHEME

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15CS51

Fifth Semester B.E. Degree Examination, June/July 2019 Management and Entrepreneurship for IT Industry

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing
ONE full question from each module.**

Module-1

- 1 a. Define management. Explain the characteristics of management. (05 marks)
- b. Explain the different roles of manager in an organization. (06 marks)
- c. Explain the contribution of F.W. Taylor to management. (05 Marks)

OR

- 2 a. Define planning. Explain the general steps involved in planning. (08 Marks)
- b. What is selection? Explain in detail the process of selection. (08 Marks)

Module-2

- 3 a. Explain the leadership styles in detail with its advantages and disadvantages. (09 marks)
- b. What is motivation? Explain Herzberg's motivation hygiene theory or the two-factor theory. (07 Marks)

OR

- 4 a. What is co-ordination? Explain the importance of co-ordination. (06 Marks)
- b. Define control. Explain the different methods of establishing control. (10 Marks)

Module-3

- 5 a. Define entrepreneur. What are the characteristics of an entrepreneur? (04 Marks)
- b. Explain the various stages of entrepreneurial process. (08 Marks)
- c. What are the Barriers to entrepreneurship? (04 Marks)

OR

- 6 a. Explain in detail entrepreneurship in India. (06 marks)
- b. Explain in detail identification of business opportunities with various types of feasibility study. (10 Marks)

Module-4

- 7 a. Explain the need and significance of project report. (06 marks)
- b. What is project report? Explain the guidelines provided by planning commission for preparation of project report. (10 Marks)

OR

- 8 a. Explain the supply chain management in detail. (06 Marks)
- b. Explain in detail, Human resource management. (10 Marks)

Module-5

- 9 a. Explain the steps involved in establishing micro and small enterprises. (08 marks)
- b. Discuss the case study of N.R. Narayana Murthy and Infosys. (08 Marks)

OR

- 10 a. Explain the objectives and functions of SIDBI and KIADB. (08 Marks)
- b. Discuss the case study of Microsoft. (08 Marks)

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Fifth Semester B.E. Degree Examination, June/July 2019 Computer Networks

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Describe in detail the services offered by DNS and explain the DNS message format. (08 Marks)
- b. Illustrate the basic operation of SMTP and FTP. (08 Marks)

OR

- 2 a. Explain the persistent and non-persistent connection of HTTP. (08 Marks)
- b. Define a socket. Describe the socket programming using TCP. (08 Marks)

Module-2

- 3 a. Draw and explain the FSM for sender and receiver side of rdt 2.1 protocol. (08 Marks)
- b. Elaborate the three-way handshaking procedure used in TCP. (04 Marks)
- c. Suppose that 2 measured sample RTT values are 106 ms and 120 ms. Compute
 - (i) Estimated RTT after each of these sample RTT value is obtained, Assume $\alpha = 0.125$ and estimated RTT is 100 ms just before first of the sample obtained.
 - (ii) Compute DevRTT, Assume $\beta = 0.25$ and DevRTT was 5 msec before first of these samples are obtained. (04 Marks)

OR

- 4 a. With an FSM, explain the three phases of congestion control. (08 Marks)
- b. Write the TCP segment structure and explain its fields. (04 Marks)
- c. Elaborate the working of Go-Back N protocol. (04 Marks)

Module-3

- 5 a. Give the format of IPV6 datagram and explain the fields. (06 Marks)
- b. What are the message types used in IGMP? (03 Marks)
- c. Write the link state routing algorithm and apply it to the following graph with source node [Refer Fig.Q5(c)] is 'u'. (07 Marks)

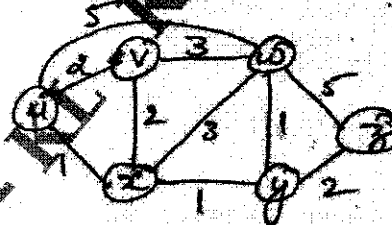


Fig.Q5(c)

OR

- 6 a. What is routing? Write the structure of a router. (07 Marks)
- b. List the broadcast routing algorithms? Explain any one of them. (04 Marks)
- c. Describe the intra-AS routing protocols in detail (05 Marks)

Module-4

- 7 a. Illustrate the two different approaches for routing to a mobile node. (08 Marks)
b. With a neat diagram, bring out the steps for mobile node registration to home agent. (08 Marks)

OR

- 8 a. Bring out the components of 3G Cellular Network architecture. (08 Marks)
b. State handoff? What are the steps involved in accomplishing handoff. (05 Marks)
c. Explain the three phases of mobile IP. (03 Marks)

Module-5

- 9 a. Bring out the leaky bucket mechanism for traffic policing. (07 Marks)
b. Classify the multimedia network applications. (03 Marks)
c. Describe the link scheduling mechanisms. (06 Marks)

OR

- 10 a. List the categories of streaming stored video. Explain any one of them. (08 Marks)
b. Explain the working of CDN. (08 Marks)

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CBCS SCHEME

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15CS53

Fifth Semester B.E. Degree Examination, June/July 2019 Database Management System

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define DBMS. Discuss the advantages of DBMS over the traditional file system. (08 Marks)
b. Explain the component modulus of DBMS and their interaction, with the help of a diagram. (08 Marks)

OR

- 2 a. Define the following with an example :
i) Weak entity type ii) Participation constraints
ii) Cardinality ratio iv) Recursive relationship. (08 Marks)
b. Draw an ER diagram of Banking system taking into account atleast five entities, indicate all keys, constraints and assumptions that are made. (08 Marks)

Module-2

- 3 a. What is meant by Integrity Constraint? Explain the importance of referential integrity constraint. How referential integrity constraint is implemented in SQL? (08 Marks)
b. Consider the following Movie database ;
Movie (Title , director , Myear , Rating)
Actors (Actor , Aage)
Acts (Actor , title)
Directors (Director , dage)
Write the following queries in relational algebra on the database given ;
i) Find movies made by "Hanson" after 1997.
ii) Find all actors and directors.
iii) Find "Coen's" movie with "Mc Dormand".
iv) Find (director , actor) pairs where the director is younger than the actor. (08 Marks)

OR

- 4 a. Discuss insulation , deletion and modification anomalies. Why are they considered bad? Illustrate with an example. (08 Marks)
b. Write the SQL queries for the following relational schema ;
Sailors (Sid , Sname , Rating, Age)
Boats (Bid , Bname , color)
Reserve (Sid , Bid , Day)
i) Retrieve the Sailor's name who have reserved red and green boat.
ii) Retrieve the no : of boats which are not reserved.
iii) Retrieve the Sailors name who have reserved boat number 103.
iv) Retrieve the Sailors name who have reserved all boats. (08 Marks)

Module-3

- 5 a. How are triggers and assertions defined in SQL? Explain. (08 Marks)
b. How are views created and dropped? Explain how the views are implemented and updated. (08 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Explain the Single – tier and Client – server architecture, with a neat diagram. (08 Marks)
 b. Explain the following :
 i) Embedded SQL ii) Database stored procedure. (08 Marks)

Module-4

- 7 a. Which Normal form is based on the concept of transitive functional dependency? Explain the same with an example. (08 Marks)
 b. What is the need for normalization? Consider the relation :
 Emp – proj = {SSn , Pnumber , Hours , Ename , Pname , Plocation}.
 Assume {SSn , Pnumber} as primary key.
 The dependencies are ;
 $\{SSn , Pnumber\} \rightarrow Hours$
 $SSn \rightarrow Ename$
 $Pnumber \rightarrow \{Pname , Plocation\}$
 Normalize the above relation to 3NF. (08 Marks)

OR

- 8 a. What is Functional Dependency? Find the minimal cover using the minimal cover algorithm for the following functional dependency.
 $F = \{AB \rightarrow D , B \rightarrow C , AE \rightarrow B , A \rightarrow D , D \rightarrow EF\}$ (08 Marks)
 b. Consider two sets of functional dependency.
 $F = \{A \rightarrow C , AC \rightarrow D , E \rightarrow AD , E \rightarrow H\}$ and $G = \{A \rightarrow CD , E \rightarrow AH\}$.
 Are they equivalent? (08 Marks)

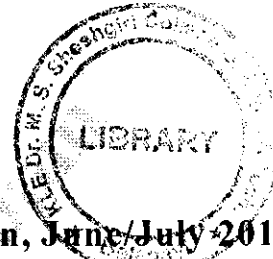
Module-5

- 9 a. Discuss the ACID properties of a database transaction. (04 Marks)
 b. Why Concurrency control is needed? Demonstrate with an example. (12 Marks)

OR

- 10 a. Discuss the UNDO and REDO operations and the recovery techniques that use each. (06 Marks)
 b. Discuss the time – stamp ordering protocol for concurrency control. (05 Marks)
 c. Explain how shadow paging helps to recover from transaction failure. (05 Marks)

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Fifth Semester B.E. Degree Examination, June/July 2019 Automata Theory and Computability

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define the following : i) string ii) alphabet iii) language. (06 Marks)
- b. Design a deterministic finite state machine for the following language over $\Sigma = \{a, b\}$.
 - i) $L = \{W \mid |W| \bmod 3 > |W| \bmod 2\}$
 - ii) $L = \{w \mid w \text{ ends either with } ab \text{ or } ba\}$. (10 Marks)

OR

- 2 a. Write a note on finite state transducers. (07 Marks)
- b. Define DFSM? Minimize the following FSM. [Refer Fig.Q2(b)]

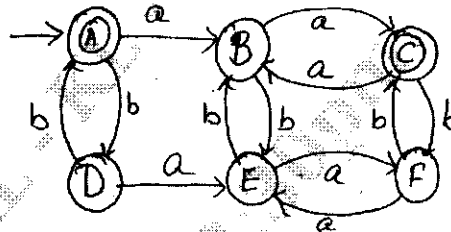


Fig Q2(b)

(09 Marks)

Module-2

- 3 a. Write the equivalent Regular Expression for the given Finite state machine. [Refer Fig.Q3(a)] (08 Marks)

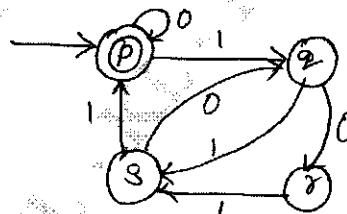


Fig Q3(a)

- b. Write the Regular Expression for the following language.
 - i) $\{w \in \{a, b\}^* \text{ with atmost one } a\}$
 - ii) $\{w \in \{a, b\}^* \text{ does not end with } ba\}$
 - iii) $\{w \in \{0, 1\}^* \text{ has substring } 001\}$
 - iv) $\{w \in \{0, 1\}^* \mid |W| \text{ is even}\}$. (08 Marks)

OR

- 4 a. State and prove the pumping theorem for regular language. (08 Marks)
- b. Show that the language $L = \{a^n b^n \mid n \geq 0\}$ is not regular. (08 Marks)

Module-3

- 5 a. Define grammar. Write the CFG for the following language.
 i) $L = \{w \in \{a, b\}^* \mid n_a(w) = n_b(w)\}$
 ii) $L = \{a^i b^j \mid i = j + 1\}$. (08 Marks)
 b. What is inherent ambiguity? Show that the language given is inherently ambiguous?
 $L = \{a^n b^n c^m \mid n, m \geq 0\} \cup \{a^n b^m c^n \mid n, m \geq 0\}$. (08 Marks)

OR

- 6 a. Define PDA? Design PDA for the language $L = \{a^n b^m a^n \mid n, m \geq 0\}$. (06 Marks)
 b. Convert the following language from CFG to PDA $L = \{ww^R \mid w \in \{0, 1\}^*\}$. (06 Marks)
 c. Convert the following CFG to CNF $E \rightarrow E + E \mid E * E \mid (E) \mid id$. (04 Marks)

Module-4

- 7 a. Prove that the language $L = \{a^n b^n c^n \mid n \geq 0\}$ is not context free. (08 Marks)
 b. Prove that CFL are not closed under intersection, complement or difference? (08 Marks)

OR

- 8 a. Design a Turing machine to accept $L = \{a^n b^n c^n \mid n \geq 0\}$. (08 Marks)
 b. Define a turning machine. Explain the working of a turning machine. (05 Marks)
 c. Write a note on multitape machine. (03 Marks)

Module-5

- 9 Write a short notes on :
 a. Growth rate of function (05 Marks)
 b. Church-turning thesis (06 Marks)
 c. Linear bounded automata. (05 Marks)

OR

- 10 Write a short notes on :
 a. Post correspondence problem (05 Marks)
 b. Halting problem in turning machine (05 Marks)
 c. Various types of turning machine. (06 Marks)

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15CS552

Fifth Semester B.E. Degree Examination, June/July 2019 Introduction to Software Testing

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain testing and debugging life cycle with a neat diagram. (08 Marks)
- b. List and explain different software quality attributes in detail. (08 Marks)

OR

- 2 a. Explain functional testing and structural testing. (08 Marks)
- b. Explain different types of software test metrics in detail. (08 Marks)

Module-2

- 3 a. Explain boundary value analysis. Write boundary value test cases for NextDate function. (08 Marks)
- b. Write a pseudo code for structured programming version of triangular problem. (08 Marks)

OR

- 4 a. List and explain equivalence class testing with diagram. Write equivalence class test cases for commission problem. (08 Marks)
- b. Explain the basic decision table terms. Draw the decision table for triangular problem with rule count. (08 Marks)

Module-3

- 5 a. Explain McCabe's basis path testing method with an example. (08 Marks)
- b. What is Fault – based testing? Explain about assumptions in fault – based testing and mutation analysis terminology. (08 Marks)

OR

- 6 a. Explain data flow testing. Derive du paths for variables locks, stocks, barrel, sales and commission variables in commission problem. (08 Marks)
- b. Explain about slice based testing in data flow testing. (08 Marks)

Module-4

- 7 a. Explain test oracles and self check as oracle in detail. (08 Marks)
- b. Explain the following principles : (08 Marks)
 - i) Sensitivity ii) Redundancy iii) Partition iv) Visibility.

OR

- 8 a. List and explain dependability properties with examples. (08 Marks)
- b. List and explain risks in process and quality management. (08 Marks)

Module-5

- 9 a. Explain different integration testing strategies. (08 Marks)
- b. What is Regression testing? What are the different regression testing strategies? (08 Marks)

OR

- 10 a. What is Call – graph based integration testing? Explain the strategies under call based integration testing. (08 Marks)
- b. Define MM – path graph. Explain with an example. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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15CS553

Fifth Semester B.E. Degree Examination, June/July 2019 Advanced Java and J2EE

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What are enumerations? How to use an enum constructor, instance variable and method? Explain with example. (06 Marks)
- b. What is Autoboxing? Write a Java program that demonstrates autoboxing/unboxing occurs inside expressions. (06 Marks)
- c. Demonstrate marker annotations with an example. (04 Marks)

OR

- 2 a. Explain the various type wrappers used in Java. (05 Marks)
- b. What is Annotation? Explain various retention policies for annotations in Java. (05 Marks)
- c. Explain how to obtain annotations at run-time by use of reflection? (06 Marks)

Module-2

- 3 a. Explain the following collection interfaces: i) Queue ii) SortedSet. (08 Marks)
- b. Demonstrate ArrayList class for collections with an example. (08 Marks)

OR

- 4 a. Explain the following Map classes : i) HashMap ii) TreeMap. (08 Marks)
- b. Define legacy class-vector. Write a Java program to demonstrate various vector operations. (08 Marks)

Module-3

- 5 a. Explain the following string comparison methods with examples :
i) equals() ii) regionMatches() iii) startsWith iv) endsWith(). (08 Marks)
- b. Explain the various string constructors used in Java with examples. (08 Marks)

OR

- 6 a. Explain the following methods of StringBuffer class with examples :
i) capacity() ii) reverse() iii) deleteCharAt() iv) charAt(). (08 Marks)
- b. How compareTo() method differs from compareToIgnoreCase() method? Write a Java program to sort an array of string in descending order by ignoring the case. (08 Marks)

Module-4

- 7 a. Explain the life cycle of servlets. (04 Marks)
- b. How to handle HTTP GET requests and HTTP Post requests? Explain with examples. (08 Marks)
- c. Write a servlet program that demonstrates how to use session state. (04 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. What is JSP? Explain the various types of JSP tags with examples. (10 Marks)
b. What is a cookie? Write a JSP program to create and read a cookie. (06 Marks)

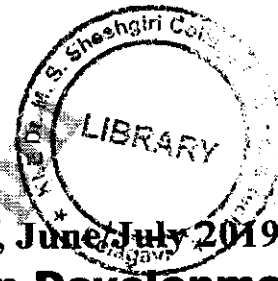
Module-5

- 9 a. List and explain the different types of JDBC drives types. (06 Marks)
b. Write a Java program to execute a database transaction. (06 Marks)
c. List and explain the three kinds of exceptions occurred in JDBC. (04 Marks)

OR

- 10 a. Explain the various steps of JDBC with code snippets. (08 Marks)
b. Explain the following statement objects with examples :
i) PreparedStatement object
ii) CallableStatement object. (08 Marks)

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Fifth Semester B.E. Degree Examination, June/July 2019 Dot Net Framework for Application Development

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing
ONE full question from each module.

Module-1

- 1 a. What is a console application? Explain the steps to create a console application in visual studio 2015. (07 Marks)
- b. Explain the purpose of namespaces and assemblies. (04 Marks)
- c. Explain the steps to create a graphical application and create a user interface to print the greeting message. (05 Marks)

OR

- 2 a. Define local scope and class scope. (02 Marks)
- b. Create a method that calculates all arithmetic operations (+, -, *, /, %(mod)) and explain the procedure to generate a method stub wizard that help you to write methods. Explain the use of visual studio 2015 debugger to step in and step out of method call as they run. (10 Marks)
- c. Explain the exception handling using try and catch statements. (04 Marks)

Module-2

- 3 a. Explain the propose of encapsulation and define a class and control the accessibility of members in a class, illustrate with an example? (07 Marks)
- b. What is a constructor? Explain the object creation that invoke the constructor, write and call your own constructor by explaining with an example. (05 Marks)
- c. Explain in detail anonymous classes with an example. (04 Marks)

OR

- 4 a. Explain ref and out parameters with an example. (06 Marks)
- b. Give the differences between a structure and class. (04 Marks)
- c. Write a method that can accept any number of arguments of any type by using the params keyword. (06 Marks)

Module-3

- 5 a. What is inheritance? Discuss about method hiding and overriding by using the new, virtual and override keywords. (08 Marks)
- b. Define an interface by specifying the signatures and return type of methods and implement an interface in a structure and class. (08 Marks)

OR

- 6 a. Explain in detail how garbage collection works. (08 Marks)
- b. Given the purpose dispose method and explain the calling of dispose method from destructor. (08 Marks)

Module-4

- 7 a. Explain the use of get and set assessors. (06 Marks)
b. Describe an interface containing properties by using structure and classes. (04 Marks)
c. What is an indexer? Differentiate between indexers and arrays. (06 Marks)

OR

- 8 a. Explain in detail about generics. (02 Marks)
b. Explain the functionality provided in the different collection classes available within the .NET framework. (14 Marks)

Module-5

- 9 a. Define an enumerator that can be used to iterate over the elements in a collection. (04 Marks)
b. Explain the use of delegates and given examples of delegates in the .NET framework class library. (12 Marks)

OR

- 10 a. Declare an event. Explain in detail about raising an event and handling an event by using a delegate. (06 Marks)
b. Define Language-Interred Query (LINQ) queries to examine the contents of enumerable collections. (10 Marks)

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Fifth Semester B.E. Degree Examination, June/July 2019
Artificial Intelligence

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is AI technique? List less desirable properties and representation of knowledge. (08 Marks)
- b. Explain production system with components and characteristics. List the requirement of good control strategies. (08 Marks)

OR

- 2 a. List and explain the AI problem characteristics. (08 Marks)
- b. Explain constraint satisfaction and solve the cryptarithmic problem :
CROSS + ROADS = DANGER. (08 Marks)

Module-2

- 3 a. List and explain the issues in knowledge Representation. (08 Marks)
- b. State and explain the algorithm to convert predicates to clausal form. (08 Marks)

OR

- 4 a. Consider the following predicates
 - i) Man (Marcus)
 - ii) Pompeian (Marcus)
 - iii) born (Marcus, 40)
 - iv) $\forall x ; \text{man}(x) \rightarrow \text{mortal}(x)$
 - v) $\forall x : \text{Pompeian}(x) \rightarrow \text{died}(x, 79)$
 - vi) erupted (volcano, 79)
 - vii) $\forall x : \forall t_1 : \forall t_2 : \text{mortal}(x) \wedge \text{born}(x, t_1) \wedge \text{gt}(t_2 - t_1, 150) \rightarrow \text{dead}(x, t_2)$
 - viii) now = 1991
 - ix) $\forall x : \forall t : [\text{alive}(x, t) \rightarrow \sim \text{dead}(x, t)] \wedge [\sim \text{dead}(x, t) \rightarrow \text{alive}(x, t)]$
 - x) $\forall x : \forall t_1 : \forall t_2 : \text{died}(x, t_1) \wedge \text{gt}(t_2, t_1) \rightarrow \text{dead}(x, t_2)$
- b. Prove that : $\sim \text{alive}(\text{Marcus}, \text{now})$ (10 Marks)
- b. What is matching in rule based system? briefly explain the different proposals for matching. (06 Marks)

Module-3

- 5 a. What is non monotonic reasoning? Explain the logics and approaches for non monotonic reasoning. (08 Marks)
- b. Why truth maintenance systems are required? Explain different types truth maintenance systems. (08 Marks)

OR

- 6 a. Explain Dempster – Shafer theory with example. (08 Marks)
- b. Define semantic net. Represent the following sentence using partitioned semantic net :
 - i) Every dog in town has bitten the constable
 - ii) Every dog has bitten every mail carrier. (08 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Define conceptual dependency. List goals and primitive acts with meaning. (08 Marks)
b. Explain the scripts with components. Write the script for the Restaurant. (08 Marks)

OR

- 8 a. State and explain the MINIMAX algorithm with example. (08 Marks)
b. Explain iterative deepening. Write algorithms for Depth First iterative deepening and Iterative deepening A. (08 Marks)

Module-5

- 9 a. What is Natural language processing? Explain the steps in process. (08 Marks)
b. Explain the spell checking with different techniques. (08 Marks)

OR

- 10 a. What is learning? Explain the Winston's learning program with example. (08 Marks)
b. Explain the expert system and knowledge acquisition process, with example. (08 Marks)

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Fifth Semester B.E. Degree Examination, June/July 2019

Cloud Computing

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define cloud computing. Describe the vision introduced by cloud computing. (04 Marks)
b. Briefly summarize the cloud computing Reference model. (04 Marks)
c. Describe the characteristics and benefits of cloud computing. (08 Marks)

OR

- 2 a. What is virtualization? What are the characteristics of virtualized environments? (08 Marks)
b. What are the pros and cons of virtualization in the context of cloud computing? (08 Marks)

Module-2

- 3 a. What are the essential characteristics that identify a PaaS solution? (04 Marks)
b. What are the benefits of community cloud? (04 Marks)
c. Discuss the open challenges in cloud computing? (08 Marks)

OR

- 4 a. Explain the three service installed in Aneka container. (08 Marks)
b. Discuss infrastructure and logical organization of an Aneka cloud. (08 Marks)

Module-3

- 5 a. What are two major techniques used to define parallel implementation of computer algorithm? Explain. (04 Marks)
b. Describe how to implement a parallel matrix scalar product by using Domain decomposition. (04 Marks)
c. Bring out the differences between Aneka threads and local threads. (08 Marks)

OR

- 6 a. Define a Task. Explain the computing categories that relate to task. (08 Marks)
b. What are the features provided by Aneka for developing a parameter sweep application? (08 Marks)

Module-4

- 7 a. What is data – intensive computing? What are the open challenges in data intensive computing. (04 Marks)
b. Describe the architecture of Google File system. (04 Marks)
c. What is MapReduce programming model? Describe the kinds of problems that MapReduce can solve. (08 Marks)

OR

- 8 a. Bring out the differences between original MapReduce model and MapReduce – line frameworks. (08 Marks)
b. Describe the components of the scheduling and execution service that constitute the runtime infrastructure supporting MapReduce. (08 Marks)

Module-5

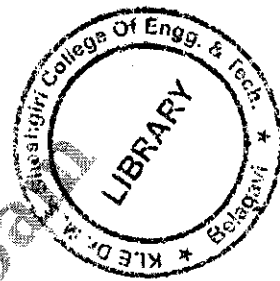
- 9 a. What is AWS? What types of service does it provide? (04 Marks)
b. Describe the application services of AppEngine. (04 Marks)
c. What is Microsoft Azure? Describe the architecture of Microsoft azure. (08 Marks)

OR

- 10 a. Describe how cloud computing technology can be applied to support remote ECG Monitoring. (08 Marks)
b. Provide some examples and media application that use cloud technologies and explain. (08 Marks)

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15CS61

Sixth Semester B.E. Degree Examination, June/July 2019 Cryptography, Network Security and Cyber Law

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Describe the types of Vulnerabilities to domain of security. (04 Marks)
- b. List the guiding principles of security. (04 Marks)
- c. Write the extended Euclidean algorithm, with an example. (08 Marks)

OR

- 2 a. Calculate the value of x using Chinese remainder theorem by given below data :
 $N = 210$, $n_1 = 5$, $n_2 = 6$, $n_3 = 7$, $x_1 = 3$, $x_2 = 5$, $x_3 = 2$. (05 Marks)
- b. Explain the Vigenere Cipher and the Hill Cipher techniques with illustration. (06 Marks)
- c. With neat diagram, explain Fiestel structure. (05 Marks)

Module-2

- 3 a. Illustrate the RSA algorithm for encryption and decryption. (08 Marks)
- b. Briefly explain the practical issues of RSA algorithm. (04 Marks)
- c. List the properties of the cryptographic hash. (04 Marks)

OR

- 4 a. Discuss the case study : SHA - 1. (08 Marks)
- b. Explain the Man - In - the - Middle attack on Diffie - Hellman key exchange, with neat diagram. (08 Marks)

Module-3

- 5 a. Explain the different Public Key Infrastructure (PKI) architectures. (08 Marks)
- b. Describe the Mutual authentication using a shared secret. (08 Marks)

OR

- 6 a. Explain the Kerberos message sequence with diagram. (06 Marks)
- b. Describe the IP Sec protocols Authentication Header and Encapsulating Security Pay load in transport mode. (05 Marks)
- c. Explain Secure Sockets Layer (SSL) hand shake protocol. (05 Marks)

Module-4

- 7 a. Explain the Authentication and Master Session Key exchange in 802.11i. (05 Marks)
- b. List and explain the worm characteristics. (05 Marks)
- c. Explain Firewall functionality and Proxy fire wall. (06 Marks)

OR

- 8 a. Write a note on Intrusion Detection System (IDS). (05 Marks)
- b. Explain the types of Intrusion Detection System. (05 Marks)
- c. Briefly explain the Technologies for Web Services. (06 Marks)

Module-5

- 9 a. Explain Digital Signature Certificates. (10 Marks)
- b. Describe the duties of Subscribers. (06 Marks)

OR

- 10 a. List any eight functions of the Controller. (08 Marks)
- b. Briefly explain Penalties and Adjudication in IT Act. (08 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2019

Computer Graphics and Visualization

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Compare random scan display with raster scan display and list the applications of computer graphics. (04 Marks)
- b. What is OpenGL? With the help of block diagram explain Library organization of OpenGL program and give the general structure of OpenGL program. (04 Marks)
- c. What is DDA? With the help of a suitable example demonstrate the working principle of Bresenham's Line drawing algorithm for different slopes of a line. (08 Marks)

OR

- 2 a. Define the following terms with respect to computer graphics.
i) Bitmap ii) Pixmap iii) aspect ratio iv) Frame buffer (04 Marks)
- b. List and explain various OpenGL primitive and its attribute functions. Develop an OpenGL program to create human face like structure using suitable OpenGL primitive functions. (06 Marks)
- c. With the help of a suitable example demonstrate Bresenham's circle drawing algorithm. (06 Marks)

Module-2

- 3 a. Explain scan line polygon fill algorithm. Determine the content of the active edge table to fill the polygon with vertices A(2, 4), B(4, 6) and C(4, 1) for $y = 1$ to $y = 6$. (06 Marks)
- b. Develop composite homogeneous transformation matrix to rotate an object with respect to a Pivot point. For the triangle A(3, 2) B(6, 2), C(6, 6) rotate it in anticlockwise direction by 90 degree keeping A(3, 2) fixed, draw the new polygon. (06 Marks)
- c. With the help of a diagram explain shearing and reflection transformation technique. (04 Marks)

OR

- 4 a. Explain the data structures used by scan line polygon fill algorithm. Determine the content of active edge table to fill the polygon with vertices A(2, 4), B(2, 7), C(4, 9) and D(4, 6). (06 Marks)
- b. Give the reason to convert transformation matrix to homogeneous co-ordinate representation and show the process of conversion. Shear the polygon A(1, 1), B(3, 1), C(3, 3) D(2, 4), E(1, 3) along x-axis with a shearing factor of 0.2. (06 Marks)
- c. i) Prove that two successive 2D rotation are additive
ii) Prove that successive scaling are multiplicative. (04 Marks)

Module-3

- 5 a. Design a transformation matrix for window to viewport transformation. And explain how reshape function (glutReshapeFunc) works in OpenGL programming. (05 Marks)
- b. With the help of a suitable diagram explain basic 3D Geometric transformation techniques and give the transformation matrix. Explain the meaning of affine transformation. (05 Marks)
- c. With the help of OpenGL statements and diagram explain illumination and shading models. (06 Marks)

OR

- 6 a. What is Clipping? With the help of a suitable example explain cohen Sutherland line clipping algorithm. (06 Marks)
- b. Design transformation matrix to rotate an 3D object about an axis that is parallel to one of the co-ordinate axes. (06 Marks)
- c. With the help of a suitable diagram, explain basic illumination, RGB and CMY colour models. (04 Marks)

Module-4

- 7 a. What is 3D viewing? With the help of a block diagram, explain 3D viewing pipeline architecture. (04 Marks)
- b. Design the transformation matrix for orthogonal and perspective projections. (06 Marks)
- c. Explain Depth buffer method and give the OpenGL visibility detection functions. (06 Marks)

OR

- 8 a. Explain the steps for transformation from world to viewing coordinate system. (04 Marks)
- b. Design the transformation matrix for perspective projection and give OpenGL 3D viewing functions. (06 Marks)
- c. Give the general classification of visible detection algorithm and explain any one algorithm in detail. (06 Marks)

Module-5

- 9 a. With the help of a suitable programming construct explain event driven input menu picking and Building interactive models. (08 Marks)
- b. Write a short notes on (any two)
- Curve and Quadric surfaces
 - OpenGL curve and surface functions
 - Bezier curve and surfaces.

(08 Marks)

OR

- 10 a. What are display lists? Explain the steps to develop interactive models and animating interactive programs. (08 Marks)
- b. Write a short note on (any two)
- Logic operations (graphics)
 - Input devices or clients and servers
 - Bezier spline curve and OpenGL curve functions.

(08 Marks)

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15CS63

Sixth Semester B.E. Degree Examination, June/July 2019 System Software and Compiler Design

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain SIC/XE architecture. (08 Marks)
- b. Generate the complete object program for the following SIC/XE assembly program.

```

WRREC  START 405D
        CLEAR X
        LDT LENGTH
WLOOP  TD OUTPUT
        JEQ WLOOP
        LDCH BUFFER, X
        WD OUTPUT
        TIXR T
        JLT WLOOP
        RSUB
        OUTPUT BYTE X '05'
        END
Address of BUFFER 4033
Address of LENGTH 4036
    
```

Op Codes :

CLEAR – B4; JEQ – 30; WD – DC; JLT – 38;
LDT – 74; LDCH – 50; TIXR – B8; RSUB – 4C. (08 Marks)

OR

- 2 a. List all assembler independent and dependant features and explain program relocation. (05 Marks)
- b. Explain the data structures used in macro processor with example. (03 Marks)
- c. Explain the following macroprocessor independent features. (08 Marks)
 - i) Generation of unique labels
 - ii) Keyword macro parameter.

Module-2

- 3 a. What is loader? What are the basic functions the loader has to perform? (04 marks)
- b. Develop an algorithm for bootstrap loader. (07 marks)
- c. Explain dynamic linking with suitable diagram. (05 Marks)

OR

- 4 a. Differentiate between a linking loader and linkage editor, with the help of suitable diagram. (08 marks)
- b. Explain different loader option commands with examples. (04 marks)
- c. Illustrate MS – DOS object module with its record types. (04 Marks)

Module-3

- 5 a. With the help of a diagram, explain the various phases of compiler. (08 Marks)
 b. Explain the concept of input buffering in the lexical analysis. (04 Marks)
 c. What design objectives, compiler optimizations must meet. (04 Marks)

OR

- 6 a. Write a LEX program for the tokens given below : (08 Marks)

LEXEMES	TOKEN NAME	ATTRIBUTE VALUE
Any WS	—	—
if	if	—
then	then	—
else	else	—
Any id	id	ptr to table entry
Any number	number	ptr to table entry
<	reloop	LT
<=	reloop	LE
=	reloop	EQ
< >	reloop	NE
>	reloop	GT
>=	reloop	GE

- b. Write regular definitions for unsigned numbers and draw the transition diagram for the same. (08 Marks)

Module 4

- 7 a. Define left recursion grammer, eliminate left recursion from the following grammer :
 $S \rightarrow aB \mid ac \mid sc \mid se$
 $B \rightarrow bBc \mid f$
 $C \rightarrow g$ (03 Marks)
 b. Consider the following context free grammer $S \rightarrow SS + \mid SS * \mid a$ and the input string $aa + a*$

- i) Give LMD and RMD
 ii) Parse tree
 iii) Is the grammer ambiguous? Why
 iv) Describe the language generated by the grammer
 v) Left factor the grammer. (05 Marks)

- c. Consider the following grammer with terminals (, [,) ,]

$$S \rightarrow TS \mid [S] S \mid)S \mid \epsilon$$

$$T \rightarrow (x)$$

$$X \rightarrow TX \mid [X] X \mid \epsilon$$

- i) Construct first and follow sets
 ii) Construct its LL(1) parsing table
 iii) Is this grammer LL(1)? (08 marks)

OR

- 8 a. The following is ambiguous grammar

$$S \rightarrow AS \mid b$$

$$A \rightarrow SA \mid a$$

Construct for this grammar its collection of sets of LR(0) items. If we try to build an LR – parsing table for the grammar, there are certain conflicting actions what are they? Suppose we tried to use the parsing table by non deterministically choosing a possible action whenever there is a conflict, show all the possible sequences of actions on input abab\$.

(10 Marks)

- b. What are the actions of a shift – reduce parser. Design shift – reduce parser for the following grammar on the input 10201 $S \rightarrow 0S0 \mid 1S1 \mid 2$.

(06 Marks)

Module-5

- 9 a. Consider the context free grammar given below :

$$S \rightarrow EN$$

$$E \rightarrow E + T \mid E - T \mid T$$

$$T \rightarrow T * F \mid T / F \mid F$$

$$F \rightarrow (E) \mid \text{digit}$$

$$N \rightarrow ;$$

i) Obtain the SDD for the above grammar

ii) Construct annotated parse tree for the input string $5 * 6 + 7$.

(08 Marks)

- b. Obtain the DAG for the expression, show the steps $a + a * (b - c) + (b - c) * d$.

(04 Marks)

- c. Translate the assignment

$a = b * -c + b * -c$ into

i) Three address code

ii) Quadruples.

(04 Marks)

OR

- 10 a. Explain the issues in the design of a code generator.

(11 marks)

- b. Write the machine instructions for the following three address instructions :

i) $b = a[i]$

ii) $a[j] = c$

iii) $x = *p$

iv) $*p = y$

v) if $x < y$ got L.

(05 Marks)



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15CS64

Sixth Semester B.E. Degree Examination, June/July 2019

Operating Systems

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the role of operating system from different viewpoints. Explain the dual mode of operation of an operating system. (07 Marks)
- b. Demonstrate the concept of virtual machine with an example. (05 Marks)
- c. Explain the types of multiprocessing system and the types of clustering. (04 Marks)

OR

- 2 a. Describe the implementation of interprocess communication using shared memory and message passing. (06 Marks)
- b. Demonstrate the operations of process creation and process termination in UNIX. (06 Marks)
- c. Explain the different states of a process, with a neat diagram. (04 Marks)

Module-2

- 3 a. Discuss the threading issues that come with multithreaded program. (08 Marks)
- b. Illustrate how Reader's-Writer's problem can be solved by using semaphores. (08 Marks)

OR

- 4 a. Calculate the average waiting time by drawing Gantt chart using FCFS (First Come First Serve), SRTF (Shortest Remaining Time first), RR (Round Robin) [q = 2 ms] algorithms.

Process	Arrival time	Burst time
P ₁	0	9
P ₂	1	4
P ₃	2	9
P ₄	3	5

- b. Explain the Dining-Philosopher's problem using monitors. (08 Marks)

Module-3

- 5 a. Determine whether the following system is in safe state by using Banker's algorithm.

Process	Allocation			Maximum			Available		
	A	B	C	A	B	C	A	B	C
P ₀	0	1	0	7	5	3	3	3	2
P ₁	2	0	0	3	2	2			
P ₂	3	0	2	9	0	2			
P ₃	2	1	2	2	2	2			
P ₄	0	0	0	4	3	3			

- b. If a request for P₁ arrives for (1 0 2), can the request be granted immediately? (09 Marks)

- b. Discuss the various approaches used for deadlock recovery. (07 Marks)

OR

- 6 a. Illustrate with example, the internal and external fragmentation problem encountered in continuous memory allocation. (07 Marks)
b. Explain the structure of page table. (09 Marks)

Module-4

- 7 a. Illustrate how demand paging affects systems performance. (08 Marks)
b. Describe the steps in handling a page fault. (08 Marks)

OR

- 8 a. Explain the various types of directory structures. (08 Marks)
b. Describe various file allocation methods. (08 Marks)

Module-5

- 9 a. Explain the access matrix model of implementing protection in operating system. (07 Marks)
b. Explain the following disk scheduling algorithm in brief with examples:
i) FCFS scheduling
ii) SSTF scheduling
iii) SCAN scheduling
iv) LOOK scheduling (09 Marks)

OR

- 10 a. Explain the components of LINUX system with a neat diagram. (08 Marks)
b. Explain the way process is managed in LINUX platform. (08 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2019 Operation Research

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing
ONE full question from each module.**

Module-1

- 1 a. Define operation research. List and explain the various phases of an operation research study. (08 Marks)
- b. A firm manufactures three products A, B and C. The profits per unit product are Rs.3, Rs.2 and Rs.4 respectively. The firm has two machines and the required processing time in minutes for each machine on each product is given below :

Machine	Product		
	A	B	C
X	4	3	5
Y	2	2	4

Machines X and Y have 2000 and 1500 machine-minutes respectively. The firm must manufacture 100A's, 200B's and 50C's but not more than 150A's. Set up an LP model to maximize the profit. (08 Marks)

OR

- 2 a. Use the graphical method to solve the following LPP :
 Maximize $Z = x + 0.5y$
 Subject to constraints $3x + 2y \leq 12$
 $5x \leq 10$
 $x + y \leq 18$
 $-x + y \geq 4$
 where $x, y \geq 0$. (12 Marks)
- b. Define i) Feasible solution ii) unbounded solution iii) Feasible region iv) Optimal solution. (04 Marks)

Module-2

- 3 a. Find all the basic solutions of the following problem :
 Maximize $Z = x_1 + 3x_2 + 3x_3$
 Subject to constraints $x_1 + 2x_2 + 3x_3 = 4$
 $2x_1 + 3x_2 + 5x_3 = 7$
 Also find which of the basic solution are :
 i) basic feasible ii) non-degenerate basic feasible iii) optimal basic feasible. (06 Marks)
- b. Solve the following LPP by Big-M method.
 Maximize $Z = -2x_1 - x_2$
 Subject to constraints $3x_1 + x_2 = 3$
 $4x_1 + 3x_2 \geq 6$
 $x_1 + 2x_2 \leq 4$
 where $x_1, x_2 \geq 0$. (10 Marks)

OR

- 4 a. Solve the following LPP by simplex method.

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

Subject to constraints $x_1 + x_2 \leq 4$

$$x_1 - x_2 \leq 4$$

$$\text{and } x_1, x_2 \geq 0.$$

(08 Marks)

- b. Solve the following LPP by two-phase simplex method.

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

Subject to constraints $2x_1 + x_2 \geq 2$

$$x_1 + 3x_2 \leq 2$$

$$x_2 \leq 4$$

$$\text{and } x_1, x_2 \geq 0$$

(08 Marks)

Module-3

- 5 a. Write applications of dual simplex method.

(06 Marks)

- b. Solve by dual simplex method the following problem :

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

Subject to constraints $2x_1 + 3x_2 + 5x_3 \geq 2$

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

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

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

(10 Marks)

OR

- 6 a. Construct the dual of the problem :

i) minimize $z = 3x_1 - 2x_2 + 4x_3$

subject to constraints $3x_1 + 5x_2 + 4x_3 \geq 7$

$$6x_1 + x_2 + 3x_3 \geq 4$$

$$7x_1 - 2x_2 - x_3 \leq 10$$

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

$$4x_1 + 7x_2 - 2x_3 \geq 2$$

$$\text{and } x_1, x_2, x_3 \geq 0.$$

(05 Marks)

ii) maximize $z = 3x_1 + 5x_2$

subject to constraints $2x_1 + 6x_2 \leq 50$

$$3x_1 + 2x_2 \leq 35$$

$$5x_1 - 3x_2 \leq 10$$

$$x_2 \leq 20$$

$$\text{where } x_1, x_2 \geq 0.$$

(05 Marks)

- b. What are the advantages of duality property?

(06 Marks)

Module-4

- 7 a. Find the initial basic feasible solution by using North-West corner rule.

(06 Marks)

	D ₁	D ₂	D ₃	D ₄	Supply
O ₁	1	5	3	3	34
O ₂	3	3	1	2	15
O ₃	0	2	2	3	12
O ₄	2	7	2	4	19
Demand	21	25	17	17	80

- b. Find the initial basic feasible solution using Vogel's approximation method.

(10 Marks)

	W ₁	W ₂	W ₃	W ₄	Availability
F ₁	19	30	50	10	7
F ₂	70	30	40	60	9
F ₃	40	8	70	20	18
Requirement	5	8	7	14	

OR

- 8 a. Solve by matrix minima method and obtain an optimal solution for the following problem:

				Available
	50	30	220	
From	90	45	170	3
	250	200	50	4
Required	4	2	2	

(10 Marks)

- b. Solve the following assignment problem :

	J_1	J_2	J_3	J_4
A	2	10	9	7
B	15	4	14	8
C	13	14	16	11
D	3	15	13	8

(06 Marks)

Module-5

- 9 a. Define : i) pure strategy ii) mixed strategy iii) optimal strategy.
b. Solve the following game by dominance principle.

(06 Marks)

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	3	2	4	0
	A_2	3	4	2	4
	A_3	4	2	4	0
	A_4	0	4	0	8

(10 Marks)

OR

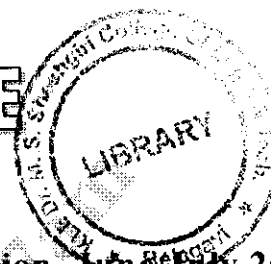
- 10 a. Solve the following game by graphical method.

(06 Marks)

		Player B				
		I	II	III	IV	V
Player A	I	2	-1	5	-2	6
	II	-2	4	-3	1	0

- b. Write short notes on :
i) Genetic algorithm
ii) Tabu search algorithm.

(10 Marks)



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15CS661

Sixth Semester B.E. Degree Examination, June/July 2019

Mobile Application Development

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is Android? With a neat diagram, explain the major components of Android stack. (06 Marks)
- b. List and explain the steps to run the Android app on virtual device. (06 Marks)
- c. Explain XML attributes taking TextView as an example. (04 Marks)

OR

- 2 a. Define Activity. Explain the steps for creating an activity in Android studio. (06 Marks)
- b. Explain the steps for sending the implicit intents. (08 Marks)
- c. List out the steps for running the debugger. (02 Marks)

Module-2

- 3 a. What is focus? Explain the algorithm used for focus movement. (06 Marks)
- b. How do you write espresso tests with Ham Crest matches? (04 Marks)
- c. Explain how material design color palette is used. (06 Marks)

OR

- 4 a. Explain the designing of floating action button. (06 Marks)
- b. How do you code in XML, the Navigation drawers. (06 Marks)
- c. Explain, how do you make use of UI animator for tests that span multiple apps. (04 Marks)

Module-3

- 5 a. Explain AsyncTask usage with an example. (06 Marks)
- b. What are Broadcast Intents? Explain system Broadcast intents and custom broadcast intents. (06 Marks)
- c. What is job scheduler? Explain its components. (04 Marks)

OR

- 6 a. What is a loader? How do you start and restart a loader? (05 Marks)
- b. Explain with a neat diagram, lifecycle of a started service VS bound service. (04 Marks)
- c. Explain scheduling of single use alarm. Also explain doze mode and App standby mode. (07 Marks)

Module-4

- 7 a. Explain about external storage and Internal storage. (06 Marks)
- b. What is SQLite? Explain the steps for implementing SQLite database. (06 Marks)
- c. How do you implement a CursorLoader? (04 Marks)

OR

- 8 a. Differentiate between shared preferences versus shared instance state. (05 Marks)
b. What is content provider? With a neat diagram, explain App Architecture with a content provider. (06 Marks)
c. Explain the following database operation: insert(), delete(), update(). (05 Marks)

Module-5

- 9 a. What is permission? Explain its importance. (05 Marks)
b. Explain how data is stored in firebase real-time database. (05 Marks)
c. Explain how do you monitor the performance of running app. (06 Marks)

OR

- 10 a. What is firebase? How do you get started with fire base? (06 Marks)
b. What is an APK? How do you prepare your app for release? (06 Marks)
c. Write a note on Firebase Analytics. (04 Marks)

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15CS664

Sixth Semester B.E. Degree Examination, June/July 2019

Python Application Programming

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. List the features of Python Programming Language (at least FIVE). (05 Marks)
- b. What is the role of a programmer? List two skills required to be a programmer. (05 Marks)
- c. Explain the chained and nested conditional execution statements along with syntax and flow chart. (06 Marks)

OR

- 2 a. What are Python words and sentences? Explain with an example for each. (04 Marks)
- b. Differentiate compiler and interpreter. (04 Marks)
- c. Write python programs to i) Find largest of three numbers
ii) Check whether the given year is leap year or not with functions. (08 Marks)

Module-2

- 3 a. With syntax, explain the finite and infinite looping constructs in python. What is the need for break and continue statements. (08 Marks)
- b. Write a Python program to generate and print prime numbers between 2 to 50. (04 Marks)
- c. What are String slices? Explain the slicing operator in Python with examples. (04 Marks)

OR

- 4 a. Write a Python program to count the number of occurrences of a given word in a file. (06 Marks)
- b. Write a Python function that takes decimal number as input and convert that to binary equivalent and return the same. (04 Marks)
- c. List any six methods associated with strings and explain each of them with an example. (06 Marks)

Module-3

- 5 a. What are the ways of traversing a list? Explain with an example for each. (04 Marks)
- b. Differentiate Pop and Remove methods on lists. How to delete more than one element from a list. (06 Marks)
- c. Write a Python program that accepts a sentences and build dictionary with LETTERS, DIGITS, UPPER CASE, LOWER CASE as key values and their count in the sentences as values. Ex: Sentence = "VTU@123.e-Learning"
d = {"LETTERS": 12, "DIGITS": 3, "UPPER CASE": 4, "LOWER CASE": 8}. (06 Marks)

OR

- 6 a. Compare and contrast lists and tuples. (04 Marks)
- b. Write a program to check the validity of a password read by users. The following criteria should be used to check the validity. Password should have atleast
i) One lower case letter ii) One digit iii) One upper case letter
iv) One special character from [\$ # @ !] v) Six character.
Your program should accept a Password and check the validity using above criteria and print "valid" or "invalid" as the case may be. (08 Marks)

- c. Demonstrate i) how a dictionary items can be represented as a list of tuples.
ii) How tuples can be used as keys in dictionaries? (04 Marks)

Module 4

- 7 a. What is a Class? How to define a class in Python? How to instantiate a class and how the class members are accessed? (04 Marks)
b. Differentiate class variables and instance variables. (02 Marks)
c. Write a Python program that uses datetime module within a class, takes a birthday as input and prints the age and the number of days, hours, minutes and seconds until the next birthday. (10 Marks)

OR

- 8 a. Write a program that has a class Point with attributes as X and Y co-ordinates. Create two objects of this class and find the midpoint of both the points. Add a method reflex_x to class point, which returns a new point. Which is the reflection of the point about the x – axis.
Ex : point (5, 10) \Rightarrow reflex_x returns point (5, -10). (06 Marks)
b. Differentiate between simple, multiple and multi – level inheritance. (06 Marks)
c. Write a program that has a class Person. Inherit a class Student from Person which also has a class MarksAttendance. Assume the attributes for Person class as : USN, Name, dob, gender. Attributes for Student class as : Class, branch, year, MA. Attributes for MarksAttendance: Marks, Attendance. Create a student S = Student("1AB16CS005", "XYZ", "18-1-90", "M", 85, 98) and display the details of the student. (04 Marks)

Module 5

- 9 a. Demonstrate with the help of Python construct i) how to retrieve an image over HTTP.
ii) how to retrieve web pages with urllib (08 Marks)
b. Compare and contrast the JavaScript Object Notation (JSON) and XML. (04 Marks)
c. What is Service – Oriented Architecture? List the advantages of the same. (04 Marks)

OR

- 10 a. Write a Python program that retrieve an user's Twitter friends, Parse the returned JSON and extract some of the information about the friends. (08 Marks)
b. Create a simple spidering program that will go through Twitter accounts and build a database of them. (08 Marks)

CBCS SCHEME

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15CS71

Seventh Semester B.E. Degree Examination, June/July 2019 Web Technology and its Applications

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What are the three aims of HTML5 and expand the following : HTML, XML, DOCTYPE, PHP, WHATWG. (08 Marks)
- b. List out the three types of lists and explain them with an example. (08 Marks)

OR

- 2 a. Define CSS and list out its benefits with explanation. (08 Marks)
- b. What are selectors? List and explain selectors with an example. (08 Marks)

Module-2

- 3 a. Apply the following table elements to display the following table:
Table elements : table, td, tr, th, tbody,tfoot,thead

SLNO	USN	Name	Dept
1			
2			
Total No. of rows	2	-	-

- b. Explain with a neat diagram how form works? Discuss about query string and micro formats. (08 Marks)

OR

- 4 a. Identify the approaches to CSS layouts and explain them in detail. (08 Marks)
- b. What is responsive design? Why its important? Explain in detail. (08 Marks)

Module-3

- 5 a. What is JavaScript and listener? Discuss the advantages and disadvantages of client side scripting. (08 Marks)
- b. What are s/w layers? What benefits do they provide? Explain in detail. (08 Marks)

OR

- 6 a. Compare the Server-Side Technologies in detail. (08 Marks)
- b. Write a PHP program to demonstrate the session. Program: Store page view count on refresh. (08 Marks)

Module-4

- 7 a. What are super global arrays? List and explain. (08 Marks)
- b. Define constructor and discuss the concepts of inheritance, polymorphism and object interface with respect to OOP. (08 Marks)

OR

- 8 a. Explain with an example, the two basic techniques for read/write files in PHP. (08 Marks)
b. Write the PHP code to validate phone number. (08 Marks)

Module-5

- 9 a. What are cookies? What is the purpose of it? Demonstrate cookies with PHP program. (08 Marks)
b. Discuss jQuery selectors in detail. (08 Marks)

OR

- 10 a. Discuss the following :
(i) Session cookies (ii) Persistent cookies (iii) Session state (08 Marks)
b. With a neat diagram explain SOAP and RESET web services. (08 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2019 Advanced Computer Architectures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the evolution of computer architecture. (08 Marks)
- b. Explain with diagram the operational model of SIMD super computer. (08 Marks)

OR

- 2 a. Explain the Bernstein's conditions for parallelism. Detect the parallelism in the following code using Bernstein's conditions. (Assume no pipeline).
 $P_1 : C = D \times E$; $P_2 : M = G + C$; $P_3 : A = B + C$; $P_4 : C = L + M$; $P_5 : G \div E$. (08 Marks)
- b. With a diagram, explain the operation of tagged token data flow computer. (08 Marks)

Module-2

- 3 a. Distinguish between typical RISC and CISC process architectures. (08 Marks)
- b. With a diagrams, explain the models of a basic scalar computer system. (08 Marks)

OR

- 4 a. With a diagram, explain a typical superscalar RISC processor architecture consisting of an integer unit and a floating point unit. (10 Marks)
- b. With a diagram, explain the hierarchical memory technology. (06 Marks)

Module-3

- 5 a. Explain with diagram, the backplane bus specification. (08 Marks)
- b. With the diagrams, explain the central arbitration and distribution arbitration. (08 Marks)

OR

- 6 a. For the reservation table of a non-linear pipeline shown below :

	1	2	3	4	5	6
S ₁	X					X
S ₂		X			X	
S ₃			X			
S ₄				X		
S ₅		X				X

- i) What are the forbidden latencies? Write initial collision vector
- ii) Draw the state transition diagram
- iii) List all simple cycles and greedy cycles
- iv) Determine MAL. (10 Marks)
- b. Explain prefetch buffer and internal data forwarding mechanisms used in instruction pipelining. (06 Marks)

Module-4

- 7 a. Explain crossbar networks and cross-point switch design in multiprocessor system. (08 Marks)
b. With necessary sketches, explain the cache-coherence problems in data sharing and in process migration. (08 Marks)

OR

- 8 a. With a diagram, explain the architecture of the connection machine CM-2. (08 Marks)
b. Explain the context-switching policies. (08 Marks)

Module-5

- 9 a. Explain the concurrent OOP and an actor model in object – oriented model. (08 Marks)
b. Explain the fairness policies and sole-access –protocols in the principles of synchronization. (08 Marks)

OR

- 10 a. What are the major hurdles of pipelining? Illustrate the branch hazards in detail. (08 Marks)
b. Explain the dynamic scheduling of a pipeline using Tomasulo's algorithm. (08 Marks)

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15CS73

Seventh Semester B.E. Degree Examination, June/July 2019

Machine Learning

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define machine learning. Describe the steps in designing learning system. (08 Marks)
- b. Write Find-S algorithm and explain with example. (04 Marks)
- c. Explain List-Then-Eliminate algorithm. (04 Marks)

OR

- 2 a. List out any 5 applications of machine learning. (05 Marks)
- b. What do you mean by hypothesis space, instance space and version space? (03 Marks)
- c. Find the maximally general hypothesis and maximally specific hypothesis for the training examples given in the table using candidate elimination algorithm. (08 Marks)

Day	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

Module-2

- 3 Construct decision tree for the following data using ID3 algorithm.

Day	A1	A2	A3	Classification
1	True	Hot	High	No
2	True	Hot	High	No
3	False	Hot	High	Yes
4	False	Cool	Normal	Yes
5	False	Cool	Normal	Yes
6	True	Cool	High	No
7	True	Hot	High	No
8	True	Hot	Normal	Yes
9	False	Cool	Normal	Yes
10	False	Cool	High	No

(16 Marks)

OR

- 4 a. Explain the concept of decision tree learning. Discuss the necessary measure required to select the attributes for building a decision tree using ID3 algorithm. (08 Marks)
- b. Discuss the issues of avoiding over fitting the data, handling continuous data and missing values in decision trees. (08 Marks)

Module-3

- 5 a. Explain artificial neural network based on perception concept with diagram. (06 Marks)
- b. What is gradient descent and delta rule? Why stochastic approximation to gradient descent is needed? (04 Marks)
- c. Describe the multilayer neural network. Explain why back propagation algorithm is required. (06 Marks)

OR

- 6 a. Derive the back propagation rule considering the output layer and training rule for output unit weights. (08 Marks)
 b. What is squashing function & why is it needed? (04 Marks)
 c. List out and explain in briefly representation power of feed forward networks. (04 Marks)

Module-4

- 7 a. Explain maximum a posteriori (MAP) hypothesis using Bayes theorem. (06 Marks)
 b. Estimate conditional probabilities of each attributes {colour, legs, height, smelly} for the species classes: {M, H} using the data given in the table. Using these probabilities estimate the probability values for the new instance – (Colour = Green, Legs = 2, Height = Tall and Smelly = No) (10 Marks)

No	Colour	Legs	Height	Smelly	Species
1	White	3	Short	Yes	M
2	Green	2	Tall	No	M
3	Green	3	Short	Yes	M
4	White	3	Short	Yes	M
5	Green	2	Short	No	H
6	White	2	Tall	No	H
7	White	2	Tall	No	H
8	White	2	Short	Yes	H

OR

- 8 a. Explain Naive Bayes classifier and Bayesian belief networks. (10 Marks)
 b. Prove that how maximum likelihood (Bayesian learning) can be used in any learning algorithms that are used to minimize the squared error between actual output hypothesis and predicted output hypothesis. (06 Marks)

Module-5

- 9 a. Explain locally weighted linear regression. (08 Marks)
 b. What do you mean by reinforcement learning? How reinforcement learning problem differs from other function approximation tasks. (05 Marks)
 c. Write down Q-learning algorithm. (03 Marks)

OR

- 10 a. What is instance based learning? Explain K-Nearest neighbour algorithm. (08 Marks)
 b. Explain sample error, true error, confidence intervals and Q-learning function. (08 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2019

UNIX System Programming

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What do you understand by the term feature test macros? List all the five feature test macros along with their meanings. (08 Marks)
- b. Write C/C++ program to check the following limit using function defined by POSIX.1
- i) Number of clock ticks per second
 - ii) Maximum number of child process
 - iii) Maximum path length
 - iv) Maximum number of character in a filename (08 Marks)

OR

- 2 a. Write notes on: i) POSIX.1 FIPS standard ii) X/open standard (08 Marks)
- b. Explain the common characteristics of API and describe the error status code and their meaning. (08 Marks)

Module-2

- 3 a. What is a file? Explain different file types available in UNIX or POSIX systems. Also write the commands to create all the files. (08 Marks)
- b. Explain the UNIX Kernel support for files with a neat diagram. (08 Marks)

OR

- 4 a. Explain the following API's along with prototypes:
i) open ii) fcntl iii) lseek iv) stat & fstat (08 Marks)
- b. Explain directory file API's and FIFO file API's. (08 Marks)

Module-3

- 5 a. Explain with a neat diagram how a C-program is started and terminated in various ways. (08 Marks)
- b. Describe the UNIX Kernel support for a process. Show the related data structure. (08 Marks)

OR

- 6 a. Explain the following functions: i) waitid ii) wait3() iii) wait4() (08 Marks)
- b. What is job control? What are the three forms of support from OS required for job control mechanism? Explain with the help of neat diagram. (08 Marks)

Module-4

- 7 a. What is signal? Discuss any five POSIX defined signals. Explain how to set up a signal handler. (08 Marks)
- b. What is signal mask of a process? Explain sigprocmask function along with its prototype. (08 Marks)

OR

- 8 a. Briefly explain the Kill() API and alarm() API. (08 Marks)
b. What is daemon? Explain coding rules and error logging. (08 Marks)

Module-5

- 9 a. What are pipes? What are its limitations? Write a program to send data from parent to child over a pipe. (08 Marks)
b. What is FIFO? Explain how it is used in IPC. Discuss with an example, the client server communications using FIFO's. (08 Marks)

OR

- 10 a. What are message queues? Write the structure of the message queue and explain each member in detail. (08 Marks)
b. Write short notes on:
i) Stream pipes
ii) Passing File Descriptors (08 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2019 Storage Area Networks

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is a data center? List the core components of data center. Explain the characteristics of data center. (08 Marks)
- b. Discuss volume manager and compute virtualization in detail. (08 Marks)

OR

- 2 a. Differentiate between software and hardware RAID. Illustrate how parity method is used for RAID levels. (08 Marks)
- b. With a neat diagram explain ISS. Explain in detail the cache component of ISS. (08 Marks)

Module-2

- 3 a. List and explain different FC connectivity options with a neat diagram. (08 Marks)
- b. With diagram explain ISCSI implementation. (08 Marks)

OR

- 4 a. What is NAS? Explain NAS implementation in detail. (08 Marks)
- b. List the key features of Content Addressed Storage (CAS). Illustrate with a neat block diagram the unified storage for CAS system. (08 Marks)

Module-3

- 5 a. Explain with a neat diagram BC planning lifecycle. (08 Marks)
- b. Mention backup topologies. List various backup forget solution and explain any one with a neat diagram. (08 Marks)

OR

- 6 a. List various uses of local replication. Explain storage array based local replication with a neat diagram. (08 Marks)
- b. Differentiate between Synchronous and Asynchronous based remote replication model. (08 Marks)

Module-4

- 7 a. List various cloud computing characteristics. Explain the cloud computing infrastructure components with a neat diagram. (08 Marks)
- b. With diagram explain different cloud deployment models. (08 Marks)

OR

- 8 Explain in detail in band and out of band virtualization appliances with a neat diagram. (16 Marks)

Module-5

- 9 a. What are the different rules tried for information security? Explain in detail FCSAN based security implementation. (08 Marks)
- b. List and explain different storage infrastructure management activities in detail. (08 Marks)

OR

- 10 a. Explain different storage management activities. (08 Marks)
- b. What is ILM? List and explain various benefits of ILM. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

CBCS SCHEME

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15CS81

Eighth Semester B.E. Degree Examination, June/July 2019 Internet of Things Technology

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. What is IOT? Explain in detail on Genesis of IOT. (08 Marks)
b. What does IOT and digitalization mean? Elaborate on this concept. (04 Marks)
c. Write a short note on "IOT impact in Real World". (04 Marks)

OR

- 2 a. Discuss IOT challenges. (08 Marks)
b. With a neat diagram, explain architecture of IOT. (04 Marks)
c. Explain Core IOT functional stack. (04 Marks)

Module-2

- 3 a. List and explain different types of sensors. (08 Marks)
b. Elaborate on small physical objects and small virtual objects. (04 Marks)
c. Explain "IOT Access Technologies". (04 Marks)

OR

- 4 a. Briefly explain protocol stack utilization IEEE 802.15.4. (08 Marks)
b. What is SANET? Explain some advantages and disadvantages that a wireless based solution offers. (08 Marks)

Module-3

- 5 a. Explain working of IP as the IOT network layer. (08 Marks)
b. Write note on Business case for IP. (04 Marks)
c. Discuss need for optimization. (04 Marks)

OR

- 6 a. Describe application protocols for IOT. (08 Marks)
b. Discuss the various methods used in IOT application transport. (08 Marks)

Module-4

- 7 a. What do you mean by data and analytics for IOT? Explain. (04 Marks)
b. Discuss Bigdata analytics tools and technology. (04 Marks)
c. With a case study relate the concept of securing IOT. (08 Marks)

OR

- 8 a. Explain in detail how IT and OT security practices and systems vary in real time. (08 Marks)
b. Discuss OCTAVE and FAIR formal risk analysis. (08 Marks)

Module-5

- 9 a. Give a brief note on Arduino UNO. (04 Marks)
b. With a neat diagram, explain Raspberry Pi board. (04 Marks)
c. With a neat diagram, explain wireless temperature monitoring system using Raspberry Pi. (08 Marks)

OR

- 10 a. Explain in detail smart city IOT architecture. (08 Marks)
b. With the case study explain smart and connected cities using Raspberry Pi. (08 Marks)

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Eighth Semester B.E. Degree Examination, June/July 2019
Big Data Analytics

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. How does the Hadoop MapReduce Data flow work for a word count program? Give an example. (08 Marks)
 b. Briefly explain HDFS Name Node Federation, NFS Gateway, Snapshots, Checkpoint and Backups. (08 Marks)

OR

- 2 a. What do you understand by HDFS? Explain its components with a neat diagram. (10 Marks)
 b. Bring out the concepts of HDFS block replication, with an example. (06 Marks)

Module-2

- 3 a. Explain Apache Squoop Import and Export method with neat diagrams. (10 Marks)
 b. Explain with a neat diagram, the Apache Oozie work flow for Hadoop architecture. (06 Marks)

OR

- 4 a. How do you run Map Reduce and Message Passing Interface (MPI) on YARN architecture? Discuss. (10 Marks)
 b. What do you understand by YARN Distributed-Shell? (06 Marks)

Module-3

- 5 a. Write any four Business Intelligence Application for various sectors. (08 Marks)
 b. Explain the star schema design of Data Warehousing with an example. (06 Marks)
 c. What is Confusion Matrix? (02 Marks)

OR

- 6 a. Explain CRISP-DM cycle with a neat diagram. (08 Marks)
 b. What do you understand by the term Data Visualization? How is it important in Big data Analytics? (05 Marks)
 c. Differentiate between Data Mining and Data Warehousing. (03 Marks)

Module-4

- 7 a. What is a splitting variable? Describe three criteria for choosing a splitting variable. (04 Marks)
 b. List some of the advantages and disadvantages of Regression Model. (04 Marks)
 c. Create a decision tree for the following data set.

Age	Job	House	Credit	Loan Approved
Young	False	No	Fair	No
Young	False	No	Good	No
Young	True	No	Good	Yes
Young	True	Yes	Fair	Yes
Young	False	No	Fair	No

Age	Job	House	Credit	Loan Approved
Middle	False	No	Fair	No
Middle	False	No	Good	No
Middle	True	Yes	Good	Yes
Middle	False	Yes	Excellent	Yes
Middle	False	Yes	Excellent	Yes
Old	False	Yes	Excellent	Yes
Old	False	Yes	Good	Yes
Old	True	No	Good	Yes
Old	True	No	Excellent	Yes
Old	False	No	Fair	No

Then solve the following problem using the model:

Age	Job	House	Credit	Loan Approved
Young	False	False	Good	???

(08 Marks)

OR

- 8 a. Explain the design principles of an Artificial Neural Network. (08 Marks)
 b. How does the Apriori Algorithm work? Apply the same for the following example.

TID	List of Item-IDs
T ₁₀₀	I ₁ , I ₂ , I ₅
T ₂₀₀	I ₂ , I ₄
T ₃₀₀	I ₂ , I ₃
T ₄₀₀	I ₁ , I ₂ , I ₄
T ₅₀₀	I ₁ , I ₃
T ₆₀₀	I ₂ , I ₃
T ₇₀₀	I ₁ , I ₃
T ₈₀₀	I ₁ , I ₂ , I ₃ , I ₅
T ₉₀₀	I ₁ , I ₂ , I ₃

Assume the support count = 2.

(08 Marks)

Module-5

- 9 a. What is Naïve Bayes Technique? Explain its model. (05 Marks)
 b. What is a Support Vector Machine? Explain its model. (08 Marks)
 c. Mention the 3-step process of Text Mining. (03 Marks)

OR

- 10 a. Explain briefly the three different types of web mining. (06 Marks)
 b. Compute the rank values for the Nodes for the following network shown in Fig.Q10(b), which is the Highest ranked node. Solve the same with eight iterations.

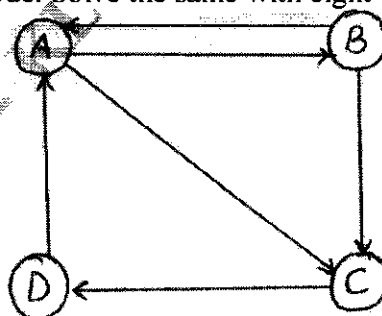


Fig.Q10(b)

(10 Marks)

2 of 2

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Eighth Semester B.E. Degree Examination, June/July 2019

Modern Interface Design

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the Importance and Benefits of good user Interface Design. (04 Marks)
- b. Write any four differences between GUI and Webpage Design. (04 Marks)
- c. Explain in detail, the characteristics of GUI. (08 Marks)

OR

- 2 a. Explain the concept of Direct Manipulation for Graphical Systems. (04 Marks)
- b. Discuss the characteristics of Intranet and Internet and bring out the differences between them. (04 Marks)
- c. Discuss the general principles of User Interface Design (any 8). (08 Marks)

Module-2

- 3 a. List and explain the five commandments in designing for people. (06 Marks)
- b. Describe in detail, the important human characteristics in user Interface Design (any five). (10 Marks)

OR

- 4 a. Explain the common usability problems in web based systems. (06 Marks)
- b. Explain the techniques for determining the user requirements using Indirect methods. (10 Marks)

Module-3

- 5 a. Explain the structure of Menus with illustrations. (06 Marks)
- b. Describe the components of a Web Navigation System with illustration. (10 Marks)

OR

- 6 a. Describe the functions of Menus. (06 Marks)
- b. List all kinds of Graphical Menus and explain any one in detail. (10 Marks)

Module-4

- 7 a. Explain the components of a window with example. (08 Marks)
- b. Discuss briefly about the types of windows with examples (any four). (08 Marks)

OR

- 8 a. Describe overlapping windows and tiled windows presentation styles with examples. (08 Marks)
- b. Explain the characteristics of touch Screen and keyboard. (08 Marks)

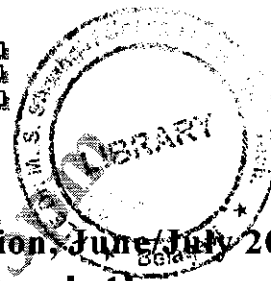
Module-5

- 9 a. Explain Radio Buttons and List Boxes selection controls. (08 Marks)
- b. Explain any two types of testing prototypes used in User Interface Design. (08 Marks)

OR

- 10 a. Explain Slider and Tree View operable controls. (08 Marks)
- b. Explain Cognitive Walkthroughs, Think aloud Evaluations and Usability tests conducted in user Interface Design. (08 Marks)

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15CS834

Eighth Semester B.E. Degree Examination, June/July 2019 System Modelling and Simulation

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is simulation? Explain with flowchart the steps involved in simulation study. (08 Marks)
- b. A computer technical support centre is staffed by two people. Able and Baker, who take calls and try to answer questions and solve computer problems. The time between calls ranges from 1 to 4 minutes with the distribution as shown in table 1.1. Able is more experienced and can provide service faster than Baker, which means that, when both are idle, Able takes the call. The distribution of their service times are shown in table 1.2 and Table 1.3: Inter arrival time (IAT) distribution

Table 1.1 : Inter Arrival Time (IAT) distribution

IAT (mins)	1	2	3	4
Probability	0.25	0.40	0.20	0.15

Table 1.2: Service Time (ST) Distribution of Able

Service time (mins)	2	3	4	5
Probability	0.30	0.28	0.25	0.17

Table 1.3 : Service time distribution of Baker

Service time (mins)	3	4	5	6
Probability	0.35	0.25	0.20	0.20

Random digits for inter arrival times are :

26, 98, 90, 26, 42, 74, 80, 68, 22, 48, 34, 45, 24, 34

Random digits for service time are :

95, 21, 51, 92, 89, 38, 13, 61, 50, 49, 39, 53, 88, 01, 81

Simulate this system for 10 customers by

- Finding (i) Average inter arrival time (ii) Average service time of Able
(iii) Average service time of Baker.

(08 Marks)

OR

- 2 a. List the various concepts used in discrete event simulation and explain any four of these with examples. (08 Marks)
- b. Consider a single server queuing system with inter arrival and service time details as shown below :

IAT	1	1	6	3	7	5	2	4	1
ST	4	2	5	4	1	5	4	1	4

Stop simulation when simulation clock reaches 23.

(08 Marks)

Module-2

- 3 a. Explain binomial and Poisson distribution and give probability mass function, mean and variance. (06 Marks)
- b. Explain the following continuous distributions :
i) Uniform distribution ii) Exponential distribution iii) Triangular distribution
iv) Normal distribution. (10 Marks)

OR

- 4 a. Explain the characteristics of a queuing system. (08 Marks)
 b. Explain the various steady state parameters of M/G/1 queue. (08 Marks)

Module-3

- 5 a. Use the linear congruential method to generate a sequence of random numbers with $X_0 = 27$, $a = 17$, $C = 43$ and $m = 100$. Write 3 ways of achieving maximal period. (08 Marks)
 b. The sequence of random members 0.44, 0.81, 0.14, 0.05, 0.93 has been generated. Use Kolmogorav Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are uniformly distributed on the interval $[0, 1]$ can be rejected. Take $D_\alpha = 0.565$. (08 Marks)

OR

- 6 a. Suggest a step by step procedure to generate random variates using inverse transform technique for exponential distribution. (08 Marks)
 b. What is acceptance rejection technique? Generate three Poisson variates with mean $\alpha = 0.2$. The random numbers are 0.4357, 0.4146, 0.8353, 0.9952, 0.8004, 0.7945, and 0.1530. (08 Marks)

Module-4

- 7 a. Explain the steps involved in the development of a useful model of input data. (08 Marks)
 b. Apply chi – square goodness of fit test for Poisson distribution with $\alpha = 3.64$, data size = 100 and observed frequency $O_i = 12, 10, 19, 17, 10, 8, 7, 5, 5, 3, 3, 1$ [$\eta_{0.05, 5} = 11.1$]. (08 Marks)

OR

- 8 a. Explain the different ways of selecting input models when data is not available. (08 Marks)
 b. Explain the types of simulation with respect to output analysis. Give examples. (08 Marks)

Module-5

- 9 a. Discuss output analysis for steady state simulation in detail. (08 Marks)
 b. Discuss output analysis for terminating simulation in detail. (08 Marks)

OR

- 10 a. Explain with neat diagram, a model building verification and validation. (08 Marks)
 b. Describe the 3 steps approach formulated by Naylor and Finger in the validation process. (08 Marks)

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