CBCS SCHEME

USN | | | | | | | | | | 15MAT41

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

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Employ Taylor's series method, find $y(0.1)$ considering upto third degree term if $y(x)$ satisfies the equation $\frac{dy}{dx} = x - y^2$, $y(0) = 1$. **(05 Marks)**

b. Using Runge-Kutta method of fourth order, find $y(0.1)$ for the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$ taking $h = 0.1$. **(05 Marks)**

c. Apply Milne's method to compute $y(1.4)$ correct to four decimal places given $\frac{dy}{dx} = x^2 + \frac{y}{2}$ and following the data : $y(1) = 2$, $y(1.1) = 2.2156$, $y(1.2) = 2.4649$, $y(1.3) = 2.7514$. **(06 Marks)**

OR

2 a. Use Taylor's series method to find $y(4.1)$ given that $(x^2 + y)y' = 1$ and $y(4) = 4$. **(05 Marks)**

b. Find y at $x = 0.8$, given $y' = x - y^2$ and $y(0) = 0$, $y(0.2) = 0.02$, $y(0.4) = 0.0795$, $y(0.6) = 0.1762$. Using Adams – Bashforth method. Apply the corrector formula. **(05 Marks)**

c. Using Modified Euler's method find y at $x = 0.1$ given $y' = 3x + \frac{y}{2}$ with $y(0) = 1$ taking $h = 0.1$. **(06 Marks)**

Module-2

3 a. Obtain the solution of the equation $2y'' = 4x + y'$ with initial conditions $y(1) = 2$, $y(1.1) = 2.2156$, $y(1.2) = 2.4649$, $y(1.3) = 2.7514$ and $y'(1) = 2$, $y'(1.1) = 2.3178$, $y'(1.2) = 2.6725$, $y'(1.3) = 3.0657$ by computing $y(1.4)$ applying Milne's method. **(05 Marks)**

b. If α and β are two distinct roots of $J_n(x) = 0$ then prove that $\int_0^1 xJ_n(\alpha x)J_n(\beta x)dx = 0$ if $\alpha \neq \beta$. **(05 Marks)**

c. Show that $J_{-1/2}(x) = \sqrt{\frac{2}{\pi x}}\cos x$ **(06 Marks)**

OR

4 a. Given $y'' - xy' - y = 0$ with the initial conditions $y(0) = 1$, $y'(0) = 0$. Compute $y(0.2)$ and $y'(0.2)$ by taking $h = 0.2$ using Runge - Kutta method of fourth order. **(05 Marks)**

b. If $x^3 + 2x^2 - x + 1 = aP_0(x) + bP_1(x) + cP_2(x) + dP_3(x)$ then, find the values of a, b, c, d. **(05 Marks)**

c. Derive Rodrigue's formula

$$P_n(x) = \frac{1}{2^n n!}\frac{d^n}{dx^n}\left[(x^2-1)^n\right]$$ **(06 Marks)**

Module-3

5 a. State and prove Cauchy-Reimann equation in polar form. **(05 Marks)**

b. Discuss the transformation $w = z^2$. **(05 Marks)**

c. Find the bilinear transformation which maps the points $z = 1, i, -1$ into $w = 2, i, -2$. **(06 Marks)**

OR

6 a. Find the analytic function whose real part is

$$\frac{x^4 - y^4 - 2x}{x^2 + y^2}$$ **(05 Marks)**

b. State and prove Cauchy Integral formula. **(05 Marks)**

c. Evaluate $\int_c \frac{e^{2z}}{(z+1)(z-2)} dz$ where c is the circle : $|z| = 3$ using Cauchy's Residue theorem. **(06 Marks)**

Module-4

7 a. The probability function of a variate x is :

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

(i) Find k (ii) Evaluate $p(x < 6)$, $p(x \geq 6)$ and $p(3 < x \leq 6)$. **(05 Marks)**

b. Obtain mean and standard deviation of Binomial distribution. **(05 Marks)**

c. The joint distribution of two discrete variables x and y is $f(x, y) = (2x + y)$ where x and y are integers such that $0 \leq x \leq 2$; $0 \leq y \leq 3$.
Find : (i) Marginal distribution of x and y.
(ii) Are x and y independent. **(06 Marks)**

OR

8 a. The marks of 1000 students in an examination follows a normal distribution with mean 70 and standard deviation 5. Find the number of students whose marks will be
(i) less than 65 (ii) more than 75 (iii) between 65 and 75 [Given $\phi(1) = 0.3413$] **(05 Marks)**

b. If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals, more than two will get a bad reaction. **(05 Marks)**

c. The joint distribution of the random variables X and Y are given. Find the corresponding marginal distribution. Also compute the covariance and the correlation of the random variables X and Y. **(06 Marks)**

X \ Y	1	3	9
2	1/8	1/24	1/12
4	1/4	1/4	0
6	1/8	1/24	1/12

Module-5

9 a. Explain the terms: (i) Null hypothesis (ii) type-I and type-II errors (iii) Significance level **(05 Marks)**

b. In 324 throws of a six faced 'die', an odd number turned up 181 times. Is it reasonable to think that 'die' is an unbiased one? **(05 Marks)**

c. Three boys A, B, C are throwing ball to each other. A always throws the ball to B and B always throws the ball to C. C is just as likely to throw the ball to B as to A. If C was the first person to throw the ball find the probabilities that after three throws (i) A has the ball (ii) B has the ball (iii) C has the ball. **(06 Marks)**

OR

10 a. Find the unique fixed probability vector for the matrix

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

(05 Marks)

b. A random sample for 1000 workers in company has mean wage of Rs. 50 per day and standard deviation of Rs. 15. Another sample of 1500 workers from another company has mean wage of Rs. 45 per day and standard deviation of Rs. 20. Does the mean rate of wages varies between the two companies? **(05 Marks)**

c. A die is thrown 264 times and the number appearing on the face (x) follows the following frequency distribution.

x	1	2	3	4	5	6
f	40	32	28	58	54	60

Calculate the value of χ^2. **(06 Marks)**

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15CS42

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

Software Engineering

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. With the help of block diagram and activity model explain an insulin pump control system. Also comment on the essential high level requirements that this system must meet. **(08 Marks)**

b. Explain incremental development process in detail. Also discuss the benefits of this method compared to waterfall model. **(08 Marks)**

OR

2 a. With a neat diagram explain the different stages requirement engineering process. What are its benefits? **(08 Marks)**

b. Write a short note on :
(i) Interviewing (ii) Ethnography **(04 Marks)**

c. Explain software requirement document. **(04 Marks)**

Module-2

3 a. Explain the sequence diagram for view patient information. **(05 Marks)**

b. Explain use case models with example. **(04 Marks)**

c. Explain the state diagram of a microwave over with neat representation of sketch. **(07 Marks)**

OR

4 a. Describe the process of Rational Unified process in detail. **(08 Marks)**

b. Describe the different proposals made about how to identify object classes in object-oriented systems. Also mention different objects identified for weather station. **(08 Marks)**

Module-3

5 a. Explain test driven development. Also mention the benefits of the same. **(08 Marks)**

b. With the help of neat diagram, explain the different stages of acceptance testing process. **(08 Marks)**

OR

6 a. Define the different Lehman's laws concerning system change. **(08 Marks)**

b. Explain the process of software reengineering. Also mention the advantages of the same. **(08 Marks)**

Module-4

7 a. What is the use of project plan? Describe the different sections of project plan for plan driven development. **(08 Marks)**

b. What is the purpose of program inspection? Explain different fault classes and inspection checks done during program inspection. **(08 Marks)**

OR

8 a. Give the description of different static software product metrics. **(08 Marks)**
b. What is software pricing? Describe the different factors affecting software pricing. **(08 Marks)**

Module-5

9 a. Explain the process of prototype development. **(08 Marks)**
b. With a neat diagram, explain Boehm's spiral model. **(08 Marks)**

OR

10 a. Define any eight extreme programming practices. **(08 Marks)**
b. Explain the process of scrum. Also mention the different key characteristics of this process. **(08 Marks)**

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CBCS SCHEME

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15CS43

Fourth Semester B.E. Degree Examination, June/July 2019
Design and Analysis of Algorithm

Time: 3 hrs. Max. Marks: 80

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

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-1

1 a. What is an algorithm? Summarize the properties of an algorithm. **(04 Marks)**

b. Solve the following recurrence relation:

$x(n) = x(n/2) + n$ for $n > 1$, $x(1) = 1$

Assume $n = 2^k$ **(06 Marks)**

c. Algorithm Test(n)

```
// Input : A non negative integer 'n'
   s ← 0
   for i ← 1 to n do
       for j ← 1 to n do
           s ← s + i * j
   return s
```

(i) What does this algorithm compute?
(ii) What is the basic operation?
(iii) How many times the basic operation executed?
(iv) What is the efficiency class of this algorithm? **(06 Marks)**

OR

2 a. With neat diagram summarize the steps used to solve a given problem using computer. **(06 Marks)**

b. Consider the following algorithm:

```
Algorithm s(n)
{
  If (n = 1) return 1,
  Else return (s(n – 1) + n.n.n)
}
```

What does this algorithm? What is the basic operation? How many times the basic operation executed? **(04 Marks)**

c. Design a recursive algorithm for computing factorial of a number n. Set up a recurrence relation and find its efficiency. **(06 Marks)**

Module-2

3 a. Discuss how to find maximum and minimum element in an array recursively. Trace the same for the following data set 65, 70, 75, 80, 85, 60, 55, 50, 45. Also derive the worst case complexity. **(06 Marks)**

b. What is stable algorithm? Is quick sort stable explain with an example. **(04 Marks)**

c. Define decrease and conquer technique and mention all the variations with an example. **(06 Marks)**

OR

4 a. Design recursive algorithm for mergesort and derive its complexity. **(06 Marks)**

b. How would you demonstrate the steps used in Strassen's matrix multiplication. **(04 Marks)**

c. What actions would to take to perform topological sort using source removal method explain with an example. **(06 Marks)**

Module-3

5 a. Recall the concept of Greedy technique. **(03 Marks)**

b. In the weighted diagraph given below Fig.Q5(b), determine the shortest paths from vertex '0' to all other vertices. **(07 Marks)**

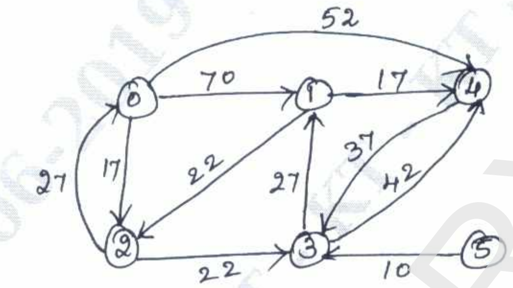

Fig.Q5(b)

c. How would you solve the following instance of knapsack problem, using greedy algorithm.

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

Knapsack capacity M = 10. **(06 Marks)**

OR

6 a. State job sequencing with deadline. Explain algorithm for job sequencing with dead line. **(08 Marks)**

b. Obtain minimum cost spanning tree for the graph given below in Fig.Q6(b), using Prim's algorithm. **(08 Marks)**

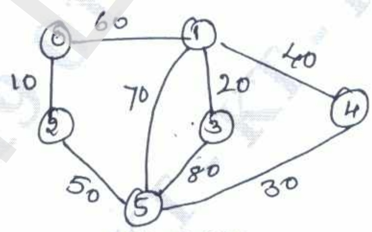

Fig.Q6(b)

Module-4

7 a. Using Floyd's Algorithm solve the all pair shortest path problem for the graph whose weight matrix is given below. **(06 Marks)**

$$\begin{bmatrix} 0 & 10 & \infty & 40 \\ \infty & 0 & \infty & 20 \\ 50 & \infty & 0 & \infty \\ \infty & \infty & 60 & 0 \end{bmatrix}$$

b. Explain Bellman Ford algorithm. **(04 Marks)**

c. State travelling sales person problem. Solve the following using dynamic programming.

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix} \quad \text{Starting city} = 1$$ **(06 Marks)**

OR

8 a. How would you define Dynamic programming? With an example illustrate multistage graph for forward approach. **(06 Marks)**

b. Using dynamic programming solve the following knapsack $n = 4$, $M = 5$, $(w_1\ w_2\ w_3\ w_4) = (2, 1, 3, 2)$, Profit $(P_1\ P_2\ P_3\ P_4) = (8, 6, 16, 11)$. **(06 Marks)**

c. Write Warshall's algorithm. **(04 Marks)**

Module-5

9 a. Explain back tracking method? Draw state space tree to generate solutions to 4-Queen's problem. **(06 Marks)**

b. What is branch and bound algorithm? How it is different from backtracking? **(04 Marks)**

c. Define the following :
(i) Class P
(ii) Class NP
(iii) NP complete problem. **(06 Marks)**

OR

10 a. Apply backtracking technique to solve the instance of the sum of subset problem :
$S = \{3, 5, 6, 7\}$ and $d = 15$. **(08 Marks)**

b. Apply branch and bound algorithm to solve the traveling salesman problem for the following graph in Fig.Q10(b). **(08 Marks)**

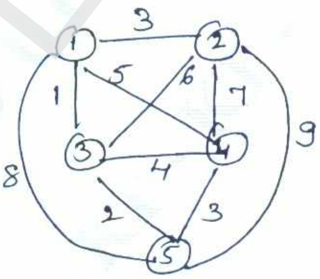

Fig.Q10(b)

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CBCS SCHEME

USN | | | | | | | | | | | **15CS44**

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

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. With a neat diagram, explain the internal block of 8088/8086 CPU. **(10 Marks)**

b. Find errors if there are any and correct the same :
(i) MOV AL, 1239H   (ii) PUSH BL   (iii) MOV 12H, BL
(iv) ADD 15H, 13H   (v) MUL AX, BX   (vi) ROL AX, 06H **(06 Marks)**

OR

2 a. Define addressing modes. List and explain various addressing modes present in the 8086 microprocessor. **(08 Marks)**

b. Assume that DS = 4500, SS = 2000, BX = 2100, SI = 1486, DI = 8500, BP = 7814 and AX = 2512.
All the values are in HEX. Show the exact physical memory location where AX is stored in each of the following :
(i) MOV [BX]+20, AX   (ii) MOV [SI]+10, AX
(iii) MOV [DI]+4, AX   (iv) MOV [BP]+12, AX **(08 Marks)**

Module-2

3 a. Write an Assembly Language Program (ALP) to calculate the total sum of 6 bytes of data. The decimal data is as follows: 125, 235, 197, 91, 100 and 48. Write suitable comments. **(06 Marks)**

b. Explain the following instructions with suitable examples.
(i) DAA   (ii) RCR   (iii) RCL   (iv) MUL **(10 Marks)**

OR

4 a. Write an assembly language program to convert lower case to upper case for the following sentence. "i aM pROud KanNaDIGA". Use suitable comments. **(06 Marks)**

b. Explain the following :
(i) INT 10H function 06H
(ii) INT 10H function 02H
(iii) INT 21H function 09H
(iv) INT 21H function 01H
(v) INT 21H function 02H **(10 Marks)**

Module-3

5 a. Show how the computer would represent the following bytes of data:
(i) –5   (ii) –7   (iii) –34H   (iv) $-128_{(10)}$ **(06 Marks)**

b. Explain the following with suitable examples:
(i) XLAT   (ii) SCANB **(05 Marks)**

c. Assuming that there is spelling of "VISVESVARAYA" in an electronic dictionary and a student type "VISHVESVARAYYA". Write an Assembly Language Program that compares these two and display the following messages depending on the result.
   (i) If they are equal "The spelling is correct"
   (ii) If they are not equal "Wrong spelling". **(05 Marks)**

OR

6 a. Explain briefly checksum byte and mention the methods being used to check the data integrity in the following storage types: ROM, DRAM, Hard Disks. **(06 Marks)**
b. Write the 8255 control word format of I/O mode. **(04 Marks)**
c. Explain IN and OUT instructions with examples. **(06 Marks)**

Module-4

7 a. Write the difference between microprocessors and microcontrollers. **(04 Marks)**
b. Explain the major design rules to implement the RISC philosophy. **(08 Marks)**
c. Write a short note on software abstraction layers executing on hardware. **(04 Marks)**

OR

8 a. With a neat diagram, explain registers available in ARM in user mode among with generic program status Register. **(06 Marks)**
b. What is pipeline in ARM? Illustrate with an example. Show the pipeline stages of ARM7, ARM9 and ARM10. **(10 Marks)**

Module-5

9 a. Explain MOVE instructions in ARM with suitable examples. **(08 Marks)**
b. Explain the following with examples:
   (i) MLA (ii) QADD
   (iii) SMULL (iv) LSL **(08 Marks)**

OR

10 a. Write the arithmetic instructions of ARM. **(06 Marks)**
b. Write the register transfer instructions of ARM **(04 Marks)**
c. Explain with example forward and backward branch in ARM. **(06 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | 15CS45

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

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain with example programs, how console input and console output are performed in C++. **(05 Marks)**
b. Explain function overloading with an example program. **(05 Marks)**
c. What are reference variables in C++? Explain with an example program. **(06 Marks)**

OR

2 a. Explain the usage of scope resolution operator with an example program. **(08 Marks)**
b. Explain parameterized constructor with an example program. **(08 Marks)**

Module-2

3 a. List and explain the java Buzzwords. **(08 Marks)**
b. Explain various arithmetic operators present in java with examples. **(08 Marks)**

OR

4 a. Explain with examples three uses of break statement in java. **(08 Marks)**
b. Explain various iteration statements present in java with code snippets. **(08 Marks)**

Module-3

5 a. What is instance variable hiding? How it can be overcome? Explain with an example. **(08 Marks)**
b. Explain method overriding with an example program. **(08 Marks)**

OR

6 a. Explain the two uses of super keyword with examples. **(06 Marks)**
b. What is exception? Demonstrate working of try and catch blocks with suitable example program. **(05 Marks)**
c. Explain the importance of finally clause with an example program. **(05 Marks)**

Module-4

7 a. Explain isAlive( ) and join( ) methods with an example program. **(08 Marks)**
b. Explain how thread can be created by implementing runnable interface with an example program. **(08 Marks)**

OR

8 a. Explain delegation event model used to handle events in Java. **(08 Marks)**
b. Briefly explain various sources of events. **(08 Marks)**

Module-5

9 a. Define Applet. Explain the skeleton of an Applet in detail. **(08 Marks)**
b. How can we pass parameters to Applets? Explain with an example program. **(08 Marks)**

OR

10 a. Explain the following: i) JButton ii) JToggleButton iii) JCheckBoxes iv) Radio Buttons. **(08 Marks)**
b. Explain JTabbedPane and JScrollPane with example programs. **(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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15CS46

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

Data Communication

Time: 3 hrs. Max. Marks: 80

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

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-1

1 a. What is data communication? With a neat diagram, explain the four basic topology. **(06 Marks)**

b. With the help of a diagram, explain the functionalities of each layer of OSI reference model. **(10 Marks)**

OR

2 a. What is the difference between a port address, a logical address and a physical address. **(06 Marks)**

b. What is line coding? Represent the sequence "01001110" using NRZ-L, NRL-I and Manchester scheme. **(06 Marks)**

c. Explain digital signal transmission methods. **(04 Marks)**

Module-2

3 a. Explain the PCM technique used for analog to digital conversion. **(08 Marks)**

b. Explain Amplitude Shift Keying (ASK) and Phase Shift Keying (PSK) modulation process. **(06 Marks)**

c. An analog signal carrier 4 bits per signal element. If 1000 signal elements are sent per second, find the bit rate. **(02 Marks)**

OR

4 a. What is TDM? Explain in detail. **(08 Marks)**

b. Explain circuit switched network with an example and also briefly discuss the phases. **(04 Marks)**

c. Explain in brief frequency hopping spread spectrum technique. **(04 Marks)**

Module-3

5 a. How does data word and codeword represented in block coding and also explain how can error be detected and corrected by using block coding. **(10 Marks)**

b. Given data word 1001 and the divisor 1011:

i) Show the generator of the codeword at the sender site

ii) Show the checking of codeword at the receiver site (assume no error). **(06 Marks)**

OR

6 a. With a neat diagram, explain Go-Back-N Automatic Repeat Request protocol of noisy channel and explain how flow control and error control is achieved. **(10 Marks)**

b. Explain the frame format of HDLC protocol. **(06 Marks)**

Module-4

7 a. What is channelization? List and explain the channelization protocols. (12 Marks)
  b. Explain Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). (04 Marks)

OR

8 a. Describe pure ALOHA and slotted ALOHA. (04 Marks)
  b. Explain the different types of addressing mechanism in IEEE 802.11. (08 Marks)
  c. Define Bluetooth and explain the architecture of Bluetooth. (04 Marks)

Module-5

9 a. Explain in detail cellular telephony. (10 Marks)
  b. Write a note on WI MAX. (06 Marks)

OR

10 a. Explain satellite network and its categories. (08 Marks)
  b. Explain in detail IPV6 packet format. (08 Marks)

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CBCS SCHEME

USN | | | | | | | | | |

15MATDIP41

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

Time: 3 hrs. Max. Marks: 80

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

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-1

1 a. Find the rank of the matrix

$$A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$$ by elementary row operation. **(06 Marks)**

b. Find the inverse of the matrix $\begin{bmatrix} 3 & 1 \\ 1 & 2 \end{bmatrix}$ using Cayley - Hamilton theorem. **(05 Marks)**

c. Find all eigen values of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ **(05 Marks)**

OR

2 a. Solve the system of equation by Gauss - Elimination method.

$x + y + z = 9$
$x - 2y + 3z = 8$
$2x + y - z = 3$ **(06 Marks)**

b. Using Cayley – Hamilton theorem find A^{-1}, given $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ **(05 Marks)**

c. Reduce the matrix $A = \begin{bmatrix} 2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ into row echelon form and hence find its rank. **(05 Marks)**

Module-2

3 a. Solve by the method of undetermined co-efficient $y'' - 4y' + 4y = e^x$. **(06 Marks)**

b. Solve $(D^3 + 6D^2 + 11D + 6)y = 0$. **(05 Marks)**

c. Solve $y'' + 2y' + y = 2x$. **(05 Marks)**

OR

4 a. Solve by the method of variation of parameter $y'' + a^2y = \sec ax$. **(06 Marks)**

b. Solve $y'' - 4y' + 13y = \cos 2x$. **(05 Marks)**

c. Solve $(D^2 - 1)y = e^{2x}$. **(05 Marks)**

Module-3

5 a. If $f(t)=t^2, 0<t<2$ and $f(t+2)=f(t)$ for $t>2$, find $L[f(t)]$. (06 Marks)

b. Find $L[\cos t \cdot \cos 2t \cdot \cos 3t]$ (05 Marks)

c. Find $L[e^{-2t}(2\cos 5t - \sin 5t)]$ (05 Marks)

OR

6 a. Find $L[e^{-t} \cdot \cos^2 3t]$ (06 Marks)

b. Express the following function into unit step function and hence find $L[f(t)]$ given

$$f(t)=\begin{cases} t, & 0<t<4 \\ 5, & t>4 \end{cases}$$ (05 Marks)

c. Find $L[t \cdot \cos at]$ (05 Marks)

Module-4

7 a. Using Laplace transforms solve the differential equation $y''+4y'+4y=e^{-t}$ given $y(0)=0$, $y'(0)=0$. (06 Marks)

b. Find $L^{-1}\left[\dfrac{2s-5}{4s^2+25}\right]+L^{-1}\left[\dfrac{8-6s}{16s^2+9}\right]$ (05 Marks)

c. Find $L^{-1}\left[\dfrac{1}{s(s+1)(s+2)(s+3)}\right]$ (05 Marks)

OR

8 a. Employ Laplace transform to solve the equation
$y''+5y'+6y=5e^{2x}$, $y(0)=2$, $y'(0)=1$. (06 Marks)

b. Find $L^{-1}\left[\dfrac{s+5}{s^2-6s+13}\right]$ (05 Marks)

c. Find $L^{-1}\left[\log\left(\dfrac{s+a}{s+b}\right)\right]$ (05 Marks)

Module-5

9 a. If A and B are any two mutually exclusive events of S, then show that
$P(A \cup B)=P(A)+P(B)-P(A \cap B)$ (06 Marks)

b. Prove the following :
(i) $P(\phi)=0$ (ii) $P(\overline{A})=1-P(A)$ (05 Marks)

c. Three machines A, B and C produce respectively 60%, 30%, 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. (05 Marks)

OR

10 a. State and prove Bay's theorem. (06 Marks)

b. If A and B are events with $P(A \cup B)=\dfrac{7}{8}$, $P(A \cap B)=\dfrac{1}{4}$ and $P(\overline{A})=\dfrac{5}{8}$ find $P(A)$, $P(B)$ and $P(A \cap \overline{B})$. (05 Marks)

c. A shooter can hit a target in 3 out of 4 shots and another shooter can hit the target in 2 out of 3 shots. Find the probability that the target is being hit.
(i) when both of them try (ii) by only one shooter. (05 Marks)

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