CBCS SCHEME

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17MAT41

Fourth Semester B.F. Degree Examination, Dec.2019/Jan.2020
Engineering Mathematics - IV

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. From Taylor's series method, find y(0.1), considering upto fourth degree term if y(x) satisfying the equation $\frac{dy}{dx} = x y^2$, y(0) = 1. **(06 Marks)**

b. Using Runge-Kut a method of fourth order $\frac{d}{dx}$ + y = 2x at x = 1.1 given that y = 3 at x = 1 initially. **(07 Marks)**

c. If $\frac{dy}{dx}$ = 2ex y, y(0) = 2, y(0.1) = 1010, y(0.2) = 2.040 and y(0.3) = 2.090, find y(0.4) correct upto four decimal places by using Milne's predictor-corrector formula. **(07 Marks)**

OR

2 a. Using modified Euler's method find y at x = 0.2 given $\frac{dy}{dx} = 3x$ 2 with y(0) = 1 taking h = **0.1.** **(06 Marks)**

b. Given $\frac{d}{dx}$I+ y + zy^2 =0 and y(0) = I, y(0.1) = 0.9008, y(0.2) = 0.8066, y(0.3) = 0,722. Evaluate y(0.4) by Adams-Bashforth method. **(07 Marks)**

c. Using Runge-Kutta method of fourth order, find y(0.2) for the equation $= \frac{Y}{dx\ y+x}$ y(0) – I taking h = 0.2. **(07 Marks)**

Module-2

3 Apply Milne's methOd to compute y(0.8) given that $\frac{d\ y}{dx^2}$= I – 2y $\frac{dy}{dx}$ and the following table of initial values.

x	0	0.2	0.4	0.6
y	0	0.02	0.0795	0.1762
	0	0.1996	0.3937	0.5689

(06 Marks)

b. Express f(x) = $x^4 + 3x^3 - x^2 + 5x - 2$ in terms of Legendre polynomials. **(07 Marks)**

C. Obtain the series solution of Bessel's differential equation $x^2y'' + xy' + (x^2 + n^2)\ y = 0$ leading to 3_1(x). **(07 Marks)**

OR

4 a. Given y" xy' - y = 0 with the initial conditions y(0) = 1, $y^1(0) = 0$, compute y(0.2) y'(0.2) using fourth order Runge-Kutta method. **(06 Mark**

b. Prove $L_{i,2}(k) = \frac{2}{TEX}\cos x$. **(07 Marks)**

c. Prove the Rodfigues formula $P_i, (x) = \frac{1}{2" n!} \frac{dy"}{dx"} (X^2 - 1)"$ **(07 Marks)**

Module-3

5 a. Derive Cauchy-Riemann equations in. Cartesian form. **(06 Marks)**

b. Discuss the transformation w = z ¯. **(07 Marks)**

C. By using Cauchy's residue theorem, evaluate $\frac{e^{2,}}{z+1)(z+2}$ dz if C is the circle 1z1= 3 .

(07 Marks)

OR

6 a. Prove that a· ex² + f(Z)|² 4 r(Z) **(06 Marks)**

b. State and prove Cauchy's integral formula. **(07 Marks)**

c. Find the bilinear transformation which maps z =00, i, 0 into w = -1, -i, 1. **(07 Marks)**

Module-4

7 a. Find the mean and standard of Poisson distribution. **(06 Marks)**

b. In an examination 7% of students score less than 35 marks and 89% of the students score less than 60 marks. Find the mean and standard deviation if the marks are normally distributed given A(1.2263) = 0.39 and A(1.4757) = 0.43 **(07 Marks)**

c. The joint probability distribution table for two random variables X and Y is as follows:

		-1	4	
1	0.1	0.2	0	0.3
2	0.2	0.1	0.1	0

Determine:

i) Marginal distribution of X and Y

ii) Covariance of X and Y

iii) Correlation of X and Y **(07 Marks)**

OR

8 a. A random variable X has the following probability function:

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

Find K and evaluate P(x 6), P(3 < x 6). **(06 Marks)**

b. The probability that a pen manufactured by a factory be defective is 1/10. If 12 such pens are manufactured, what is the probability that

i) Exactly 2 are defective

ii) Atleast two are defective

iii) None of them are defective. **(07 Marks)**

c. The length of telephone conversation in a booth has been exponential distribution and found on an average to be 5 minutes. Find the probability that a random call made

i) Ends in less than 5 minutes

ii) Between 5 and 10 minutes **(07 Marks)**

Module-5

9 a. A die is thrown 9000 times and a throw of 3 or 4 was observed 3240 times. Show that the dia cannot be regarded as an unbiased die. **(06 Marks)**

b. A group of 10 boys fed on diet A and another group of 8 boys fed on a different disk B for a period of 6 months recorded the following increase in weight (lbs):

Diet A:	Ell	6	8	ilia	4	3	9	a	10
Diet B:	2	3	6	8 10	1	2			

Test whether diets A aid B differ significantly t.05 = 2.12 at 16df **(07 Marks)**

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

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

(07 Marks)

OR

10 a. Define the terms:

i) Null hypothesis

Type-I and Type-Il error

iii) Confidence limits

(06 Marks)

b. The t.p.m. of a Markov chain is given by $P = \begin{vmatrix} 112 & 0 & 1/2 \\ 1 & 0 & 0 \\ 1/4 & 1/2 & 1/4 \end{vmatrix}$. Find the fined probabilities vector. **(07 Marks)**

c. Two boys B_1 and $B2$ and two girls G_1 and G2 are throwing ball from one to another. Each boy throws the ball to the Other boy with probability 1/2 and to each girl with probability 1/4. On the other hand each girl throws the ball to each boy with probability 1/2 and never to the other girl. In the long run how often does each receive the ball? **(07 Marks)**