CBCS SCHEME

USN | | | | | | | | | | 18SCE/SFC/LNI/SCE/SCS/SCN/SSE/SIT/SAM11

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Mathematical Foundation of Computer Science

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of statistical table permitted.

Module-1

1 a. Explain in brief:
i) Significant figures
ii) Truncation errors
iii) Round off errors
iv) Absolute error
v) Percentage errors. **(10 Marks)**

b. Perform one iteration of the Bairstow's method to extract a quadratic factor $x^2 + px + q$ from the polynomial $P_3(x) = x^3 + x^2 - x + 2 = 0$. Use the initial approximations $P_0 = -0.9$, $q_0 = 0.9$. **(10 Marks)**

OR

2 a. Find all the roots of polynomial $x^3 - 4x^2 + 5x - 2 = 0$. By Graeffe's root squaring method. **(10 Marks)**

b. Using Jacobi's method find all the eigen values of the matrix

$$A = \begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$
(10 Marks)

Module-2

3 a. A simply supported beam carries a concentrated load P at its mid point corresponding to the various values of P. The maximum deflection 'Y' is measured and is given in the following table:

P	100	120	140	160	180	200
Y	0.45	0.55	0.60	0.70	0.80	0.85

Find a law in the form $Y = a + b\underline{P}$ and hence estimate Y when $\underline{P} = 150$ **(10 Marks)**

b. Compute the coefficient of correlation and the equation of regression lines for the data:

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

(10 Marks)

OR

4 a. Fit a non-linear curve of the form $y = ax^2 + bx + c$ in the least square sense for the data and hence estimate y at x = 6. **(10 Marks)**

x	1	2	3	4	5
y	10	12	13	16	19

b. S.T if 'θ' is the acute angle between the lines of regression then $\tan\theta = \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}\left(\frac{1-r^2}{r}\right)$. Explain the significance if $r = 0$, $r = \pm 1$. **(10 Marks)**

Module-3

5 a. The probability density function of a variate X is

x	0	1	2	3	4	5	6
P(x)	K	3K	5K	7K	9K	11K	13K

Find K, $P(X < 4)$, $P(X \geq 5)$, $P(3 < X \leq 6)$ **(10 Marks)**

b. Find the constant 'K' such that $f(x) = \begin{cases} kx^2, & 0 < x < 2 \\ 0, & \text{otherwise} \end{cases}$ is a probability density function also find: (i) $P(1 < x < 2)$ (ii) $P(x \leq 1)$ (iii) $P(x > 1)$ (iv) $P(x \leq 2)$ (v) $P(x > 2)$ (vi) Mean and Variance. **(10 Marks)**

OR

6 a. Two horses A and B were tested according to the time (in seconds) to run a particular race with the following results:

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	

Test whether you can discriminate between two horses [$t_{0.05} = 2.2$, $t_{0.02} = 2.72$ for 11 df]. **(10 Marks)**

b. The following table gives the number of aircraft accidents that accured during the various week days of the week. Find the accidents are uniformly distributed over the week.

Days	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Total
No. of accidents	14	16	8	12	11	9	14	84

[Given $\psi^2_{0.05}$ 6df = 12.59] **(10 Marks)**

Module-4

7 a. Prove that the two graphs shown in Fig.Q.7(a) below are isomorphic. **(07 Marks)**

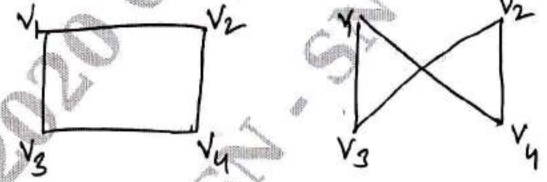

Fig.Q7(a)

b. Show that the complete graphs K2 K3 and K4 are planar graphs. **(07 Marks)**

c. Find the number of non negative integer solutions of the equation. $x_1 + x_2 + x_3 + x_4 = 25$ **(06 Marks)**

OR

8 a. Define the following:
- i) Hamilton cycle
- ii) Hamilton graph
- iii) Hamilton path. **(10 Marks)**

b. Find the number of integer solutions of the equation $x_1 + x_2 + x_3 + x_4 + x_5 = 30$ under the constraints $x_i \geq 0$ for $i = 1, 2, 3, 4, 5$ and further x_2 is Even and x_3 is Odd. **(10 Marks)**

Module-5

9 a. i) Define the terms vectorspace and subspace

ii) If W_1 and W_2 are subspaces of the vectorspace V(F) then $W_1 + W_2$ is a subspace of V(F) **(10 Marks)**

b. i) Define the terms Linear span of a set and co-ordinate

ii) S.T the set B = {(1, 1, 0) (1, 0, 1) (0, 1, 1)} is a basis of the vector space $V_3(R)$. **(10 Marks)**

OR

10 a. i) Define the terms Basis and Dimension

ii) Find the dimension and basis of the subspace spanned by the vectors (2, 4, 2) (1, -1, 0) (1, 2, 1) and (0, 3, 1) in $V_3(R)$ **(10 Marks)**

b. i) Define the terms Linear transformation and Matrix of the linear transformation

ii) Find the matrix of the linear transformation

$T : V_3(R) \rightarrow V_2(R)$ defined by

$T(x, y, z) = (x + y, y + z)$ relative to the bases $B_1 = \{(1, 1, 0)\ (1, 0, 0)\ (1, 1, 0)\}$ $B_2 = \{(1, 0)\ (0, 1)\}$. **(10 Marks)**

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