BE-I EXAMINATION FEB.-MARCH'2023
ETC (A, B) BRANCHES (RE)
2AMRC1: Applied Mathematics-II

Duration: 3Hrs.

Max.Marks:60

Note: Attempt any two parts from every question. Questions should be solved at one place. All questions carry equal marks. Any assumption made answering the questions should be stated. Assume suitable data whenever necessary.

UNIT –I

Q.1

(a) If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, find two non-singular matrices P and Q such that $PAQ = I$. Hence find A^{-1}. **06**

(b) Test for consistency and solve **06**
$$x_1 - x_2 + x_3 - x_4 + x_5 = 1; \quad 2x_1 - x_2 + 3x_3 + 4x_5 = 2;$$
$$3x_1 - 2x_2 + 2x_3 + x_4 + x_5 = 1; \quad x_1 + x_3 + 2x_4 + x_5 = 0.$$

(c) Find the eigen values and eigen vectors of $A = \begin{bmatrix} 2 & -2 & 2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$. **06**

UNIT -II

Q.2 (a) Find the differential equation whose set of independent solution is $[e^x, xe^x, x^2 e^x]$. **06**

(b) Solve $\frac{d^2y}{dx^2} - y = x\sin x + e^x + x^2 e^x$. **06**

(c) Solve the simultaneous equations: $\frac{dx}{dt} + 4x + 3y = t$, $\frac{dy}{dt} + 2x + 5y = e^t$. **06**

UNIT -III

Q.3 (a) Form Partial Differential Equation from **06**

(i) $z = yf(x) + xg(y)$. (ii) $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$.

(b) Solve $(x^2 + y^2)p + 2xyq = (x + y)z$. **06**

(c) Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = x^2 \sin(x + y)$. **06**

UNIT -IV

Q.4 (a) A and B take turns in throwing two dice, the first to throw 10 being awarded **06** the prize. Show that if A has the first throw, their chance of winning are in the ratio 12:11.

(b) Define Binomial distribution also find (i) mean and (ii) variance of B.D. **06**

(c) Calculate the coefficient of correlation between the marks obtained by 8 **06** students in mathematics and statistics:

Students	A	B	C	D	E	F	G	H
Mathematics	25	30	32	35	37	40	42	45
Statistics	08	10	15	17	20	23	24	25

UNIT -V

Q.5 (a) Solve the equation $x^4 - 2x^3 - 21x^2 + 22x + 40 = 0$ whose roots are in A.P.   06

(b) Solve by Cardan's method $x^3 - 9x^2 - 9x - 15 = 0$.   06

(c) Verify the De-Morgan's laws for the fuzzy sets given by   06

$X = \{1, \quad 2, \quad 3, \quad 4, \quad 5, \quad 6, \quad 7, \quad 8, \quad 9, \quad 10\}$

$A = \{(2, 0.1), (3, 0.3), (4, 0.5), (5, 1), (6, 0.2), (7, 0.4), (8, 0.6), (9, 0.8)\}$

$B = \{(3, 0.2), (4, 0.4), (5, 0.6), (6, 0.8), (7, 1)\}$.

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