

Roll No.

Total No. of Pages : 03

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B.Tech. (Automation & Robotics/Bio Technology/Civil
Engineering/Computer Science & Engineering/Electrical & Electronics
Engineering/Electrical Engineering/Electronics & Communication
Engineering/Information Technology/Mechanical Engineering)
(Sem.-2)

ENGINEERING MATHEMATICS – II

Subject Code : BTAM-102

M.Code : 54092

Date of Examination : 06-07-22

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Answer briefly :

a) Find the general value of $\log(-4)$.

b) If $A = \begin{bmatrix} 1 & 4 \\ -3 & 5 \end{bmatrix}$. Hence find A^{-1} .

c) Define similar matrices.

d) Solve $(x - a) \frac{dy}{dx} + 3y = 12(x - a)^3$.

e) Solve $\frac{dy}{dx} + \frac{1}{x}y = x^3 - 3$.

f) Solve $(x + y - 10)dx + (x - y - 2)dy = 0$.

g) Find the general solution of $\frac{d^3y}{dx^3} + y = 0$.

- h) Give an example of a matrix which is Skew symmetric but not skew Hermitian.
- i) Examine the vectors for Linear dependence $X_1 = (1, -1, 1)$, $X_2 = (2, 1, 1)$, $X_3 = (3, 0, 2)$
- j) State Gauss test.

SECTION-B

2. a) Solve $(1+x)^2 \frac{d^2y}{dx^2} = (1+x) \frac{dy}{dx} + y = 4 \cos[\log(1+x)]$.
- b) Solve the following differential equations $(y^2 - 2x^2y) dx + (2xy^2 - x^3) dy = 0$.
3. a) Solve $y'' + y = \operatorname{cosec} x$ by method of variation of parameters.
- b) Solve the differential equation $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = \sin e^x$.
4. The damped LCR circuit is governed by the equation $\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{C} = 0$, where L, C, R are positive constants. Find the condition under which the circuit is over damped, under damped and critically damped. Find also the critical resistance.
5. a) Solve the Clairaut's equation $y = xy' + \frac{1}{y'}$.
- b) Solve $[1 + \log(xy)]dx + \left[1 + \frac{x}{y}\right]dy = 0$.

SECTION-C

6. a) Separate into real and imaginary parts $\tan^{-1}(e^{i\theta})$.
- b) Find modulus and argument of $(1-i)^{1+i}$

7. a) Expand $\sin^8\theta$.

b) Show that the Matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ is similar to the diagonal Matrix. Also, find the Transforming Matrix and the Diagonal Matrix.

8. a) Discuss the convergence or divergence of the series $\sum \frac{n^p}{(n+1)^q}$.

b) Test the convergence of $\frac{x}{1.2} + \frac{x^2}{3.4} + \frac{x^3}{5.6} = \dots\dots\dots$

9. a) If $A = \begin{bmatrix} -1 & 1 & 2 \\ 3 & -1 & 1 \\ -1 & 3 & 4 \end{bmatrix}$, Find A^{-1} by Gauss Jordan Method.

b) Find all the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.