Roll No. | | | | | | | | | | | | | Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (CE/CSE/EE/ME/ECE) (Sem–2)

ENGINEERING MATHEMATICS – II

Subject Code : BTAM-102

M.Code : 54092

Date of Examination : 16-06-2023

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) Check whether the given equation $\left(1+x^2\right)dy+2xydx = 0$ is exact and obtain the general.

b) Find the general value of Log(–N)

c) If $A=\begin{bmatrix}1 & 4\\ 3 & 2\end{bmatrix}$. Hence find A^{-1}.

d) State Cayley Hamilton theorem.

e) Solve $\frac{dy}{dx}+y\cot x=\cos x$

f) Solve $\left(2x-y\right)dx=\left(x-y\right)dy$

g) Find the general solution of $4\frac{d^2y}{dx^2}+\frac{dy}{dx}+2y = 0$

h) Give an example of a matrix which is Skew Symmetric but not Skew Hermitian.

i) Examine the vectors for Linear dependence

$X_1 = (3,1,-4), X_2 = (2,2,-3), X_3 = (0,-4,1)$

j) Slate Logarithmic test.

SECTION-B

2. a) Solve $x^2y'' + 5xy' + 3 = 1n\ x$

b) Solve the differential equations $\left(y^2 + 2x^2y\right)dx + \left(2x^3 - xy\right)dy = 0$.

3. a) Apply method of variation of parameters to solve $\frac{d^2y}{dx^2} + 9y = \sec 3x.$

b) Solve $\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right)dy = 0$

4. An alternating e.m.f $E\ sinwt$ is applied to inductance L and capacitance C in series.

Show that the current in the circuit is $\frac{Ew}{\left(n^2 - w^2\right)L}\left(\cos wt - \cos nt\right)$, where $n^2 = \frac{1}{LC}$

5. a) Solve the differential equation $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = e^{3x}\sin 4x$.

b) Solve the Clairaut equation $y^2 - xy' + y = 0$.

SECTION-C

6. a) Separate into real and imaginary parts $\log(\sin(x + iy))$

b) Find all the values of z which satisfy $e^z = 1 + i$

7. a) Expand $\cos^6\theta$

b) Find the rank of the matrix $\begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$

8. a) Test the convergence of $x+\frac{2^2x^2}{2!}+\frac{3^3x^3}{3!}+\frac{4^4x^4}{4!}--------\infty$

b) Test the convergence of $\sum\frac{1}{\left(1+\frac{1}{n}\right)^{n^2}}$

9. a) Use Gauss Jordan method to find the inverse of a matrix $\begin{bmatrix}2 & 4 & 3 & 2\\ 3 & 6 & 5 & 2\\ 2 & 5 & 2 & -3\\ 4 & 5 & 14 & 14\end{bmatrix}$

b) Show that the Matrix $A=\begin{bmatrix}-9 & 4 & 4\\ -8 & 3 & 4\\ -16 & 8 & 7\end{bmatrix}$ is similar to the diagonal Matrix. Also find the transforming Matrix and the diagonal Matrix.

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.