Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐ Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE/IT/EEE/CSE/BT/Civil/ME/EE/EIE) (Sem.–2,3)

ENGG. MATHEMATICS-I/ENGG. MATHEMATICS-II/MATHEMATICS-II/APPLIED MATHEMATICS-II/APPLIED MATHEMATICS-III

Subject Code : AM-102/201
M.Code : 54002

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

Answer the following :

1) Are the vectors $(1, 1, -1)$, $(2, 3, -5)$, $(2, -1, 4)$ linearly dependent.

2) Find the eigen values of the matrix $\begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$.

3) Is the differential equation $(2\, xy \cos x^2 - 2xy + 1)\, dx + (\sin x^2 - x^2)dy = 0$ exact ?

4) Solve $(2D^2 - 2D - 1)\, y = 0$.

5) Write any two applications of differential equations.

6) Find velocity of a particle which moves along the curve $\vec{r} = 2\sin 3t\,\hat{i} + 2\cos 3t\,\hat{j} + 8t\,\hat{k}$.

7) State Green's theorem.

8) If $\vec{A} = x^2 z\,\hat{i} - 2y^3 z^2\,\hat{j} + xy^2 z\,\hat{k}$, then find $Div(\vec{A})$ at the point $(1, -1, 1)$.

9) Write formulae of mean and variance of binomial distribution.

10) Define null hypothesis.

SECTION-B

11) Find the rank of the matrix $\begin{bmatrix} 2 & 3 & 4 \\ 4 & 3 & 1 \\ 1 & 2 & 4 \end{bmatrix}$ after converting into normal form.

12) Solve the differential equation $\dfrac{dy}{dx} + \dfrac{3y}{x} = \dfrac{\sin x}{x^3}$.

13) Solve the differential equation $(D^2 + 2D + 1)\, y = x$.

14) Solve the differential equation $(D^2 + 4)\, y = \tan 2x$ using method of variation of parameters.

SECTION-C

15) Find the unit normal vector to the surface $x^2y + 2xz^2 = 8$ at the point $(1, 0, 2)$.

16) Verify Gauss divergence theorem for $\vec{F} = 4xz\,\hat{i} - y^2\,\hat{j} + yz\,\hat{k}$ over the cube $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$, $z = 1$.

17) A box A contains 2 white and 4 black balls. Another box B contains 5 white and 7 black balls. A ball is transferred from the box A to the box B. Then a ball is drawn from the box B. find the probability that it is white.

18) A certain stimulus administered to each of 12 patients resulted in the following increases of blood pressure : 5, 2, 8, –1, 3, 0, –2, 1, 5, 0, 4, 6. Can it be concluded that the stimulus will in general be accompanied by an increase in blood pressure. (Given that for $v = 11$, $t_{0.05} = 2.2$)

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.