C14-A-AA-AEI-BM-C-CM-CH-CHPC-
CHPP-CHOT-CHST-EC-EE-IT-M-MET-
MNG-PET-TT-RAC-PCT–**102**

4002

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—2021

DBME - FIRST YEAR (COMMON) EXAMINATION

ENGINEERING MATHEMATICS - I

Time : 3 hours] [*Total Marks* : 80

PART—A

4×5=20

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **four** marks.

1. Resolve $\frac{1}{(x-1)(x-3)}$ into partial tractions.

2. If $A = \begin{bmatrix} 0 & -1 \\ 3 & 1 \end{bmatrix}$; $B = \begin{bmatrix} 2 & 0 \\ 3 & 1 \end{bmatrix}$, find $2A + B$.

3. Find the value of $\begin{vmatrix} 1 & 0 & 1 \\ 2 & 1 & 0 \\ 1 & -1 & 1 \end{vmatrix}$.

4. Show that $\tan(45° + A)\tan(45° - A) = 1$.

5. Show that $\frac{\sin 2\theta}{1+\cos 2\theta} = \tan\theta$.

6. Find the additive inverse of $(2+3i)$.

7. Find the equation of the straight line passing through the points (1, 1) and (0, 2).

8. Find the equation of the circle whose centre is (2, 5) and radius is 2 units.

9. Evaluate $\lim_{\theta\to 0}\left(\frac{\sin 3\theta}{\tan 2\theta}\right)$.

10. Find $\frac{dy}{dx}$, if $y = xe^x$.

PART—B

15×4=60

Instructions : (1) Answer *any* **four** questions.

(2) Each question carries **fifteen** marks.

11. If $A = \begin{bmatrix} 3 & -2 \\ 4 & 1 \end{bmatrix}$. Find $A^2 - 3A + 2I$, where I is uni-matrix of order 2.

12. If $\cos x + \cos y = \frac{1}{3}$ and $\sin x + \sin y = \frac{1}{4}$, find $\tan\left(\frac{x+y}{2}\right)$.

13. Solve the triangle ABC. $a = 1; b = \sqrt{3}; c = 2$.

14. Find the equation of the Parabola whose focus is the point (3, 4) and whose directrix is the line $3x + y - 8 = 0$.

15. Differentiate $\tan^{-1}\left(\cos\sqrt{x}\right)$ with respect to x.

16. Evaluate $\frac{\partial u}{\partial x}, \frac{\partial u}{\partial y}, \frac{\partial^2 u}{\partial x^2}$ and $\frac{\partial^2 u}{\partial y^2}$ if $u = x^2 + xy + y^2$.

17. Find the lengths of the tangent and normal to the curve $y = x^3$ at (1, 1).

18. Find the maximum and minimum values of $2x^3 - 9x^2 + 12x + 15$.

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