6002

C16-A-AA-BM-CH-CHST-AEI-MNG-
CHOT-CHPC-EC-C-CM-M-RAC-CHPP-
EE-PET-MET-TT-IT-PCT–102

6002

BOARD DIPLOMA EXAMINATION, (C-16)

MARCH/APRIL—2021

FIRST YEAR (COMMON) EXAMINATION

ENGINEERING MATHEMATICS – I

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

PART—A

3×10=30

Instructions : (1) Answer **all** questions.

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

1. Resolve $\frac{1}{(x+1)(x+2)}$ into partial fractions.

2. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$, find $A + A^T$.

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

4. Show that $(\cos A - \sin A)^2 = 1 - \sin 2A$.

5. Show that $\cos 70° \cos 10° + \sin 70° \sin 10° = \frac{1}{2}$.

6. Find the modulus of $z = 2 - 3i$.

7. Find the slope of line joining two points (1, 2) and (2, 1).

8. Find the distance between the two parallel lines $2x + 3y - 5 = 0$ and $2x + 3y + 1 = 0$.

9. Evaluate $\lim_{\theta \to 0} \frac{\sin m\theta}{\sin n\theta}$.

10. If $y = x^2 + \sin x - \tan x$, find $\frac{dy}{dx}$.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each question carries **ten** marks.

11. *(a)* Solve the following system of linear equations by using Cramer's rule $x + y - z = 0$, $2x + y - z = 1$ and $3x + 2y + 2z = 5$.

(b) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$, show that $A^2 - 2A - 5I = 0$.

12. *(a)* If $A + B + C = 180°$, then show that
$\tan A + \tan B + \tan C = \tan A \tan B \tan C$.

(b) Show that $\tan^{-1}\left(\frac{3}{4}\right) - \tan^{-1}\left(\frac{5}{12}\right) = \tan^{-1}\left(\frac{16}{63}\right)$.

13. *(a)* Solve $2\sin^2\theta - \sin\theta - 1 = 0$.

(b) In a ΔABC, show that $\sin A + \sin B + \sin C = \frac{S}{R}$.

14. *(a)* Find the equation of the circle with centre at (1, 1) and radius 2 units.

(b) Find the eccentricity, foci, length of major and minor axes, vertices of an ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$.

15. *(a)* If $y=\sqrt{x+\sqrt{x+\sqrt{x+}.....\infty\ times}}$, then find $\frac{dy}{dx}$.

(b) If $x=at^2$ and $y=2at$, find $\frac{dy}{dx}$.

16. *(a)* If $y=Ae^x+Be^{-x}$, show that $\frac{d^2y}{dx^2}-y=0$.

(b) If $u=x^2+y^2$, show that $\frac{\partial^2 u}{\partial x^2}=\frac{\partial^2 u}{\partial y^2}$.

17. *(a)* Find the lengths of tangents, normal, sub tangent and sub normal to the curve $y=x^2+7x+4$ at (1, 4).

(b) Find the maximum and minimum values of $2x^3-6x^2-18x+2$.

18. *(a)* The radius of a circle is increasing at the rate of 2cm/sec. Find the rate of increase of its area when the radius is 24 cm.

(b) If there is an error of 1% in measuring the side of a square plate, find the percentage error in its area.

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