



C16-A/AA/CHST/CH/C/CM/EC/EE/
M/AEI/MNG/MET/IT/TT/PKG-102

5002

**BOARD DIPLOMA EXAMINATION, (C-16)
OCTOBER/NOVEMBER-2018
FIRST YEAR EXAMINATION**

ENGINEERING MATHEMATICS-I

Time : 3 Hours]

[Total Marks: 80

PART-A

2x15=30

- Instructions :**
1. Answer **any Fifteen** questions.
 2. Each question carries **Two**.
 3. Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. Find the value of \log_8^2 .
2. Define proper and improper fractions.
3. Resolve $\frac{3}{(x-2)(x+1)}$ into partial fractions.
4. If $A = \begin{pmatrix} i & 0 \\ 0 & i \end{pmatrix}$, then find A^2 .
5. Define singular and non singular matrices.
6. Find the inverse of the matrix $\begin{pmatrix} 1 & -1 \\ 0 & 2 \end{pmatrix}$.
7. What is the value of $\cos 15^\circ$.
8. Write the formulae of $\sin 2A$ and $\cos 2A$ in terms of $\tan A$.
9. Prove that $\frac{1+\cos 2A}{\sin 2A} = \cot A$.
10. State Sine rule.
11. If $z=4+5i$, then find $z-\bar{z}$.
12. Find the multiplicative inverse of the complex number $1+i$.
13. Find the intercepts made by straight line $2x+3y-5=0$ on the coordinate axes.
14. Find the distance between parallel lines $5x + 12y - 7 = 0$ and $5x+12y+45 = 0$.

15. Find the point circle equation with centre (1,2).
16. Find the radius of the circle $x^2 + y^2 - 6x + 4y - 12 = 0$
17. Evaluate : $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$.
18. Evaluate: $\lim_{x \rightarrow 0} \frac{e^{7x} - 1}{x}$.
19. Differentiate xe^x with respect to x.
20. Differentiate $\sin(\log x)$ with respect to x.

PART-B

10X5=50

- Instructions** :
1. Answer any **Five** questions.
 2. Each question carries **ten** marks.
 3. Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

21. (a) If $\begin{pmatrix} 1 & -1 & 0 \\ 2 & 1 & 3 \\ 4 & 1 & 8 \end{pmatrix}$ and $B = \begin{pmatrix} 4 & 1 & 0 \\ 2 & -3 & 1 \\ 1 & 1 & -1 \end{pmatrix}$, then show that $(AB)^T = B^T A^T$.

(b) Solve the following equations by Cramer's rule.

$$x + 2y - z = -1,$$

$$3x - y - 2z = 5$$

$$x - y - 3z = 0$$

22. (a) Prove that $\frac{\sin 7A + \sin 17A}{\cos 7A + \cos 17A} = \tan 12A$

(b) If $\sin x + \sin y = \frac{3}{y}$ and $\sin x - \sin y = \frac{2}{5}$, then prove that.

$$8 \tan \left(\frac{x+y}{2} \right) = 15 \tan \left(\frac{x-y}{2} \right).$$

23. (a) Prove that $\sin^{-1} \left(\frac{4}{5} \right) + \sin^{-1} \left(\frac{5}{13} \right) = \cos^{-1} \left(\frac{16}{65} \right)$.

(b) if $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \frac{\pi}{2}$, then show that $xy + yz + zx = 1$.

24. (a) Find the angle between the lines $3x - y + y = 0$ and $2x + y + 4 = 0$.

(b) Find the equation of the circle passing through the points (0,0), (6,0) and (8,4).

25. (a) Differentiate $x^{\sin x}$ with respect to x.

(b) Find the derivative of $\tan^{-1} \left(\frac{3x - x^3}{1 - 3x^2} \right)$ with respect to 'x'.

26. (a) Find $\frac{dy}{dx}$ if $y = \sqrt{\frac{1}{x} + \sqrt{\frac{1}{x} + \sqrt{\frac{1}{x} + \dots \infty}}}$.

(b) If $\sin u = \frac{x^2 y^2}{x+y}$, then show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3 \tan u$.

27. (a) Find the lengths of the tangent, normal, sub-tangent and sub-normal for the curve $y^2 = 8x$ at (3,2).

(b) Find the angle between the curve $y^2 = 4x$ and $x^2 = 4y$.

28. (a) If the sum of two numbers is 48, then find the numbers such that the sum of their squares is minimum.

(b) Show that the maximum rectangle that can be inscribed in a Circle is Square.

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