



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

5002

BOARD DIPLOMA EXAMINATION, (C-16)

NOVEMBER - 2019

**FIRST YEAR (COMMON) EXAMINATION
ENGINEERING MATHEMATICS - I**

Time : 3 Hours]

[Total Marks : 80

PART - A

$2 \times 15 = 30$

Instructions :

- (1) Answer any 15 questions.
- (2) Each question carries 2 marks.
- (3) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1 Find the value of $\log_{25} 5$.

2 Write the types of fractions with an example to each one.

3 If $\frac{3x-1}{(x-2)(x-3)} = \frac{A}{x-2} + \frac{8}{x-3}$, find the value of A .

4 Write any two types of matrices.

5 If $A = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ 2 & 4 \end{bmatrix}$, find $A^T + B^T$.

6 Find the value of $\begin{vmatrix} i & -i \\ i & i \end{vmatrix}$.

7 Find the value of $\cos 70^\circ \cdot \cos 10^\circ + \sin 70^\circ \cdot \sin 10^\circ$.

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8 Simplify $\frac{1+\cos 2A}{\sin 2A}$.

9 Write the formula of $\tan 3A$ and $\sin 3A$.

10 State Sine rule.

11 Find the conjugate complex number $(3+4i)(2-3i)$.

12 Find the modulus of $\frac{3+4i}{1+7i}$.

13 Write the intercept form of equation to the straight line.

14 Find the distance between the parallel lines $3x-4y+7=0$ and $3x-4y+5=0$.

15 Find the equation of the point circle with centre $(3, -7)$.

16 Write the center and radius to the circle $x^2+y^2+2gx+2fy+c=0$.

17 Evaluate $\lim_{x \rightarrow 3} \frac{x^3 - 27}{x - 3}$.

18 Evaluate $\lim_{x \rightarrow 0} \frac{\sin 88x}{\tan 11x}$.

19 Differentiate $2\cos x + \frac{x^5}{5} - 4\log x$ with respect to x .

20 Differentiate $\sin x \cdot \log x$ with respect to x .

PART - B

10×5=50

Instructions :

- (1) Answer any FIVE questions.
- (2) Each question carries TEN marks.
- (3) Answer should be comprehensive and criterion for valuation is the content but not the length of the answer.

21 (a) Show that $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$.

~~26~~ Solve the following equations :

$$x+y+z=2$$

$$x+2y+3z=1$$

$3x+y-5z=4$ by Cramer's rule.

22 (a) Show that $\frac{\cos 7A + \cos 5A}{\sin 7A + \sin 5A} = \cot 6A$.

(b) Prove that $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ = 0$.

23 (a) Prove that $\tan^{-1} \frac{1}{7} + \cot^{-1} 13 = \cot^{-1} \frac{9}{2}$.

(b) Solve $\cos^{-1} \frac{1-a^2}{1+a^2} + \sec^{-1} \frac{1+b^2}{1-b^2} = 2 \tan^{-1} x$.

~~24~~ (a) Find the angle between the lines $x+2y+9=0$ and $3x+y-7=0$.

(b) Find the equation of the circle with $(3, -4)$ and $(-2, 5)$ as the end points of a diameter.

25 (a) Find $\frac{dy}{dx}$, if $x = 5(0 - \sin \theta)$, $y = 5(1 - \cos \theta)$.

(b) Find $\frac{dy}{dx}$, if $y = \sqrt{\tan x + \sqrt{\tan x + \sqrt{\tan x + \dots + \infty}}}$.

26 (a) If $y = \sin^{-1} x$ show that $(1-x^2)y_2 - xy_1 = 0$.

(b) If $u = \tan^{-1} \frac{x^3 + y^3}{x-y}$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$.

~~27~~ (a) Find the equations of tangent and normal to the curve $y = x^3 - 3x^2 - x + 5$ at the point $(1, 2)$.

(b) Find the angle between the curves $y^2 = 4x$, $x = y-1$, at their points of intersection $(1, 2)$.

~~28~~ (a) Find the maximum and minimum values of $2x^3 - 9x^2 + 12x + 5$.

(b) Find the dimensions of a rectangle of maximum area having a perimeter of 72 ft.