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

5002

BOARD DIPLOMA EXAMINATION, (C-16)

MARCH / APRIL - 2019

FIRST YEAR (COMMON) EXAMINATION

ENGINEERING MATHEMATICS - I

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

PART - A **2×15=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 $\log_4 64$.

2 Define a proper fraction and give an example.

3 Resolve $\frac{1}{(x-2)(x-3)}$ into partial fractions.

4 If $A=\begin{bmatrix}1 & -3\\ 2 & 1\end{bmatrix}$ then find A^2.

5 If $\begin{vmatrix}2 & 1\\ 3 & x\end{vmatrix}=1$ find x.

6 If $A=\begin{bmatrix}2 & 5 & -3\\ 7 & 6 & 2\end{bmatrix}$ and $B=\begin{bmatrix}-1 & 2 & 7\\ 3 & -5 & 4\end{bmatrix}$ then find A^T+B^T.

7 Write the formula for $\sin(A-B)$ and $\cos(A-B)$.

8 Write the formula for $\sin^3 A$ and $\cos^3 A$.

9 Simplify $\frac{\sin\theta+\sin 2\theta}{1+\cos\theta+\cos 2\theta}$.

10 State Cosine rule.

11 Find the modulus of $\frac{3-4i}{5+7i}$.

12 Find the real and imaginary parts of $\frac{1}{1+i}$.

13 Find the equation of the line passing through the points (1, –2), (–2, 3).

14 Find the equation of the line passing through the point (3, –4) and parallel to the line $3x+5y-21=0$.

15 Find the equation of the circle whose centre is (–1, 2) and radius is 3.

16 Find the radius of the circle $x^2+y^2+4x-6y=0$.

17 Evaluate $\lim_{x\to 1}\frac{x^2-4x+3}{x^2+3x-4}$.

18 Evaluate $\lim_{x\to 0}\frac{1-\cos x}{x^2}$.

19 Differentiate $2\sin x+3\tan^{-1}x-7\log x$ with respect to 'x'.

20 Differentiate $\frac{2x+3}{5x-2}$ 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) Find the adjoint of the matrix $\begin{bmatrix}1 & 2 & 2\\ 2 & 3 & 0\\ 0 & 1 & 2\end{bmatrix}$

(b) Solve the equation $x-y+z=2$, $2x+3y-4z=-4$, $3x+y+z=8$ by Cramer's rule.

22 (a) Prove that $\frac{\sin 85^\circ-\sin 35^\circ}{\cos 35^\circ-\cos 85^\circ}=\frac{1}{\sqrt{3}}$.

(b) Prove that $\cos^2 A+\cos^2(60^\circ+A)+\cos^2(60^\circ-A)=\frac{3}{2}$.

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) Prove that $\tan^{-1}\left[\frac{1}{4}\right]+\tan^{-1}\left[\frac{3}{5}\right]=\frac{\pi}{4}$.

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

(b) If (3, 4) is one end of a diameter of the circle $x^2+y^2-4x-6y+11=0$ find the other end of the diameter.

25 (a) Differentiate $\log\left[\sin\left(\log x\right)\right]$ w.r.t. 'x'.

(b) Find $\frac{dy}{dx}$, if $x=a\left(\theta-\sin\theta\right), y=a\left(1-\cos\theta\right)$.

26 (a) If $y=\left(\sin x\right)^{\left(\sin x\right)^{\left(\sin x\right).....\infty}}$, then find $\frac{dy}{dx}$.

(b) If $u\left(x, y\right)=x^2+xy+y^2$, find $\frac{\partial^2 u}{\partial x^2}$ and $\frac{\partial^2 u}{\partial y^2}$.

27 (a) Find the equations of tangent and normal to the curve $y=x^2-3x+2$ at (2, 0)

(b) Find the lengths of the tangent, normal, subtangent and subnormal for the curve $y=x^3-2x^2+4$ at (2, 4).

28 (a) Find the maximum and minimum values of $2x^3-9x^2+12x+16$.

(b) Find the dimensions of a rectangle of maximum area having a perimeter of 36ft.
