7035

BOARD DIPLOMA EXAMINATION, (C-20)

JUNE/JULY—2022

DEEE – FIRST YEAR 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.   A function f is defined by $f(x) = x^2 + 1$ then find *(a)* $f(-1)$, *(b)* $f(0)$ and *(c)* $f(5)$.

2.   Resolve $\dfrac{1}{(x-2)(x+7)}$ into partial fractions.

3.   If $A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 0 \\ 2 & -3 & 1 \end{bmatrix}$, compute $3A - 4B$.

4.   If $\tan A = \dfrac{5}{6}$ and $\tan B = \dfrac{1}{11}$ then show that $A + B = \dfrac{\pi}{4}$.

5.   Show that $\dfrac{1 + \cos 2A}{\sin 2A} = \cot A$.

6.   Find the modulus and additive inverse of $z = 1 + i\sqrt{3}$.

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

8. Evaluate $\lim\limits_{\theta \to 0} \dfrac{\sin 3\theta}{\theta}$.

9. If $y = \sin(2x - 3)$ then find $\dfrac{dy}{dx}$.

10. If $u = x^2 + 2xy + y^2$ then find $\dfrac{\partial u}{\partial x}$ and $\dfrac{\partial u}{\partial y}$.

PART—B

8×5=40

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

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

11. *(a)* If "w" is the cube root of unity then show that $\begin{vmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{vmatrix} = 0$.

(OR)

(b) Solve the following system of linear equations by using Cramer's Rule :

$x + 2y + 3z = 6, 2x + 4y + z = 7, 3x + 2y + 3z = 8$

12. *(a)* Show that $\dfrac{\sin 8A + \sin 6A}{\cos 8A + \cos 6A} = \tan 7A$.

(OR)

(b) Show that $\tan^{-1}\left(\dfrac{1}{3}\right) + \tan^{-1}\left(\dfrac{1}{7}\right) = \tan^{-1}\left(\dfrac{1}{2}\right)$.

13. *(a)* Solve $2\sin^2\theta + 3\cos\theta - 3 = 0$.

(OR)

(b) In a $\triangle ABC$, show that $\cot A + \cot B + \cot C = \dfrac{a^2 + b^2 + c^2}{4\Delta}$.

14. (a) Find the equation of the circle having (4, 2) and (1, 5) as the extremities of the diameter.

(OR)

(b) Find the equation of the parabola whose focus is at $(1, -1)$ and directrix $3x + 4y + 5 = 0$.

15. *(a)* Find $\dfrac{dy}{dx}$, if $y = e^x \tan x + \dfrac{1 + \sin x}{1 - \sin x}$.

(OR)

(b) If $y = a(1 - \cos\theta)$ and $x = a(\theta + \sin\theta)$ then find $\dfrac{dy}{dx}$ at $\theta = \dfrac{\pi}{4}$.

PART—C

$10\times1=10$

Instructions : (1) Answer the following questions.

(2) The question carries **10** marks.

16. Find the lengths of the tangent, normal, sub-tangent and subnormal to the curve $x^2 + y^2 - 6x - 2y + 5 = 0$ at the point $(2, -1)$.

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