6052

BOARD DIPLOMA EXAMINATION
MARCH/APRIL - 2019
COMMON FIRST YEAR EXAMINATION
ENGINEERING MATHEMATICS - I

Time: 3Hours **Max. Marks : 80**

$PART - A$ $10 \times 3 = 30$

Instructions:

- Answer **ALL** questions and each question carries **THREE** marks
- Answers should be brief and straight to the point and shall not exceed **FIVE** simple sentences

(1) Resolve $\dfrac{x+3}{(x-3)(x+1)}$ into Partial Fractions

(2) If $A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & 1 & -3 \\ 4 & 3 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & 2 & 3 \end{bmatrix}$ then find $2A + 3B$

(3) If $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 4 \\ 5 & -6 & x \end{bmatrix}$ and $det(A) = 48$ then find the value of x

(4) Prove that $\dfrac{sin(A-B)}{sin\ A\ sin\ B} + \dfrac{sin(B-C)}{sin\ B\ sin\ C} + \dfrac{sin(C-A)}{sin\ C\ sin\ A} = 0$

(5) If $tan\ \theta = \dfrac{1}{2}$ then find $cos\ 2\theta$ and $sin\ 2\theta$

(6) Find the modules of the complex number $(3+2i)(1+2i)$

(7) Find the equation of line passing through the point $(3,\ -4)$ and having inclination 60^o

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

(9) Evaluate $\lim_{x\to -2}\left(\frac{x^2+x-2}{x^2+x+3}\right)$

(10) Find the derivative of $(x+3)(2x^3+3)$ with respect to x

$\boxed{PART-B}$ $5\times 10=50$

Instructions:

- Answer **ANY FIVE** questions and each question carries **TEN** marks
- The answers should be comprehensive and criteria for valuation is the content but not the length of the answer

(11) (a) Solve the equations $x+2y-z=-1$, $3x-y-2z=5$ and $x-y-3z=0$ by Crammer's Rule

(b) Find the adjoint of the matrix $\begin{bmatrix} 2 & 3 & -1 \\ -4 & 0 & 3 \\ 3 & -1 & 7 \end{bmatrix}$

(12) (a) Prove that $sin\ 78^o - sin\ 18^o + cos\ 132^o = 0$

(b) If $Sin^{-1}x + Sin^{-1}y + Sin^{-1}z = \frac{\pi}{2}$ then show that $x^2+y^2+z^2+2xyz=1$

(13) (a) Solve the equation $2\ cos^2\theta = 1 + sin\ \theta$

(b) In a $\Delta^{le} ABC$ prove that $(b+c)\ sin\left(\frac{A}{2}\right) = a\ cos\left(\frac{B-C}{2}\right)$

(14) (a) Find the equation of the Circle whose center is at the point $(-1,\ 2)$ and radius is 5 units

(b) Find the vertex, focus equation of axis, latus rectum, directrix and length of latus rectum of the Parabola $y^2 = 32x$

(15) (a) Find $\frac{dy}{dx}$, if $y = cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$

(b) Find $\frac{dy}{dx}$ if $y = (sin\ x)^{cos\ x}$

(16) (a) Find $\frac{d^2y}{dx^2}$, if $x = 6(\theta + sin\ \theta)$, $y = 6(1 - cos\ \theta)$

(b) If $u(x,\ y) = x^2 + y^2 + 9xy$, then find $\frac{\partial u}{\partial x}$, $\frac{\partial u}{\partial y}$, $\frac{\partial^2 u}{\partial x \partial y}$ and $\frac{\partial^2 u}{\partial y \partial x}$

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

(b) A circular metal expands by heat so that its radius increases at the rate of 2 cm/sec. Find the rate of increase of its area when the radius is 24 cm.

(18) (a) The sum of two numbers is 48. Find them so that their product is maximum

(b) Each side of a cube is increased by 3%. Find the approximate percentage increase in its volume. Also find the approximate percentage increase in its surface area

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