6052

BOARD DIPLOMA EXAMINATION

JUNE - 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 $\dfrac{2x^2+3x+4}{(x^2+2)(x-1)}$ into Partial Fractions

(2) Find the determinant of the matrix $\begin{bmatrix} 1 & -2 & -1 \\ 1 & -1 & -1 \\ 2 & 3 & 2 \end{bmatrix}$

(3) Show that $\begin{vmatrix} 1 & \omega \\ \omega^2 & 1 \end{vmatrix} = 0$ where ω is a complex cube root of unity

(4) Prove that $\dfrac{cos\ 7A}{sec\ A} - \dfrac{sin\ 7A}{cosec\ A} = cos\ 8A$

(5) Show that $cos^6 A + sin^6 A = 1 - \dfrac{3}{4}\ sin^2 2A$

(6) Find the real and imaginary of parts of the complex number $\dfrac{2+i}{3+i}$

(7) Find the equation of line passing through the point $(-3,\ 4)$ and having inclination $\dfrac{\pi}{4}$

(8) Find the angle between the lines $y - \sqrt{3}x - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$

(9) Evaluate $\lim_{x\to 2}\left(\frac{x^3-8}{x^5-32}\right)$

(10) Find the derivative of $x^3 tan^{-1}x$ 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 $2x-3y+z+1=0$, $x+4y-2z-3=0$ and $4x-y+3z-11=0$ by Crammer's Rule

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

(12) (a) Prove that $sin\ 85^o - sin\ 35^o - cos\ 65^o = 0$

(b) If $Cot^{-1}\left(\frac{1}{x}\right)+Cot^{-1}\left(\frac{1}{y}\right)+Cot^{-1}\left(\frac{1}{z}\right)=\frac{\pi}{2}$ then show that $xy+yz+zx=1$

(13) (a) Solve the equation $sin\ x+\sqrt{3}\ cos\ x=\sqrt{2}$

(b) In a $\Delta^{le} ABC$ if $a=4$, $b=5$, $c=7$ then find the value of $cos\left(\frac{B}{2}\right)$

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

(b) Find the center, vertices, eccentricity, foci and length of latus rectum of the Ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$

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

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

(16) (a) Find $\frac{d^2y}{dx^2}$, if $x = b\ sec^2\theta$, $y = a\ tan^2\theta$

(b) Find $\frac{\partial^2 u}{\partial x \partial y}$ and $\frac{\partial^2 u}{\partial y \partial x}$ if $u(x,\ y) = x^3 + 3xy + y^3$

(17) (a) Find the equations of tangent and normal to the curve $y = x^2 + 1$ at $(1,\ 2)$

(b) A particle moves along $s = 60t - 16t^2$ where s is in feet and t in seconds. Find the distance travelled by the particle before it first comes to rest

(18) (a) Find the maximum and minimum values of $f(x) = 2x^3 - 9x^2 + 12x + 15$

(b) The pressure P and volume V of a gas are connected by the relation $PV^{1.4} = constant$. Find the percentage increase in P if V is decreased by 1%