11/1/24

Seat Number | | | | | | |

DAGDU-22

BP–106 RMT : Remedial Mathematics

(711162)

Total Pages : 3]

Time : 1½ Hours **Max. Marks : 35**

Note : (1) Do not write anything on question paper except Seat No.

(2) Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.

(3) Students should note, no supplement will be provided.

(4) Simple non-programmable calculator is allowed.

(5) Log table is allowed.

1. Attempt any *one* of the following : 10

(A) (*i*) Differentiate the following functions with respect to x with first principle :

$$f(x) = \log \sin x$$

(*ii*) Evaluate $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$

(B) (*i*) $y = \lim_{x \to \infty} \left(1 + \frac{P}{x}\right)^x$ [From 1^∞]

(*ii*) Evaluate :

$$8^{\log_2 3\sqrt{121} + \frac{1}{3}}$$

(iii) If A and B are symmetric matrices, the AB is symmetric if AB = BA.

(iv) If $f(x) = \frac{2x}{1+x^2}$, prove that $f(\tan\theta) = \sin 2\theta$.

(v) Resolve $\frac{1}{1+x^3}$ into partial fractions.

2. Attempt any *five* : 25

(1) $L^{-1}\left\{\frac{5s+3}{(s-1)(s^2+2s+5)}\right.$ evaluate

(2) (i) $\frac{dy}{dx} = 3x^2 + \frac{1}{x}$

(ii) Solve the following differential equation :

$$\frac{dy}{dx} + 2x = 3e^x$$

(3) P and Q are two points whose co-ordinates are $(at^2, 2at)$ and $\left(\frac{a}{t^2}, -\frac{2a}{t}\right)$ respectively and S$(a, 0)$ is the point, show that $\frac{1}{SP} + \frac{1}{SQ}$ is independent of t.

(4) If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, find (A – 2I) (A – 3I).

(5) If $y = \cot x$, then $\frac{dy}{dx} = \frac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x$.

(6) Without expanding, show that $\begin{bmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{bmatrix} = (x - y)(y - z)(z - x)$.

(7) A straight line, drawn, through the point A(2, 1) makes an angle $\frac{\pi}{4}$ with the +ve direction of X-axis & intersects another line $x + 2y + 1 = 0$ at a point B. Find the length of AB.