

Seat Number

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PANKH-24

BP-106-RMT  
Remedial Mathematics  
(711162)

Total Pages : 2]

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 :

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(a) Show that the height of the cylinder of maximum volume that can be inscribed in a sphere of radius  $a$  is  $\frac{2a}{\sqrt{3}}$ .

- (b) (i) Find the derivative of  $\frac{x + \sin x}{x + \cos x}$  with respect to  $x$ .  
(ii) Find partial fraction of :

$$\frac{x}{(x+1)(x-1)(x+2)}$$

(iii) Differentiate the following function with respect to  $x$  :  
 $[\sin^{-1} ax]^2$

(iv) Evaluate the following integral :

$$\int_0^{\pi/2} \cos^2 x \, dx.$$

P.T.O.

2. Attempt any five of the following :

(a) Solve the following system of equation by matrix method :

$$x + y + z = 0, x - y - 5z = 0, x + 2y + 4z = 0.$$

(b) Differentiate  $e^{\sin x}$  from first principle.

(c) Decompose  $\frac{2x+1}{(x^2+2)(x^2+3)}$  into partial fractions.

(d) Evaluate :

$$\int \sin^4 x \, dx.$$

(e) Solve the following equation :

$$(x-y)\frac{dy}{dx} = x+3y$$

(f) Let  $A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$  and  $f(x) = x^2 - 4x + 7$ , show that  $f(A) = 0$ , use this result to find  $A^5$ .

(g) Prove that :

$$\begin{vmatrix} a+b+2c & c & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$$