MATHS (GERNAL RAJ)

F12

FIRST TERM EXAM 2015-16 Time -3hrs

GENERAL INSTRUCTION mm- 100

Question 1-6 are 1 marks each, Question 7-19 are 4 marks each , Question 20- 26 are 6 marks each.

Q.N1. $\int \tan x \, dx$ = _____

Q.N2. Find adjoint of matrix $A = \begin{bmatrix} 2 & 5 \\ 5 & 6 \end{bmatrix}$

Q.N3. Write the principal value of $\cos^{-1}(\cos\frac{7\pi}{6})$.

Q.N4. If $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$ Find x.

Q.N5.If $y = e^{\tan^{-1}x}$ find dy/ dx.

Q.N6. solve for x $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$

Q.N7. Let A = w×w and * be a binary operation on A defined by (a,b) * (c , d) = (a+c, b+d).show that * is commutative and associative .Find the identity element for * on A , if any.

Q.N8. If $f(x) = \frac{4x+3}{6x+4}$, show that fo f(x) =x where $x \neq 2/3$.what is inverse of f.

Q.N9. prove that $\cos^{-1} 12/13 + \sin^{-1} 3/5 = \sin^{-1} 56/65$.

Q.N10. prove that $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$

Q.N11. Find $A^2 - 5A + 6I$

If $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & -1 & 0 \\ 2 & 0 & 1 \end{bmatrix}$

.Q.N12. Find the value of K So that function F is continuous at the indicated point .

$$F(x)=\begin{cases}\dfrac{K\cos x}{\pi-2x} & \text{if } x\neq\dfrac{\pi}{2}\\ 3 & \text{if } x=\dfrac{\pi}{2}\end{cases} \qquad \text{at } x=\frac{\pi}{2}$$

Q.N13. Find $\frac{dy}{dx}$ of $\sin(\tan^{-1} e^{-x})$ ii) $\sec(\tan\sqrt{x})$

Q.N14. Differentiate wrt x

$$x^{\sin x} + \sin x^{\cos x}$$

Q.N15. Find $\frac{dy}{dx}$ if $x=a(\cos\theta+\theta\sin\theta)$ and $Y=a(\sin\theta-\theta\cos\theta)$

Q.N16. Evaluate $\int \sin^4 x\, dx$

Q.N17. Prove that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$

If $y = e^{a\cos^{-1}x}$ when $-1 < x < 1$

Q.N18. Find $\frac{dy}{dx}$ of (i) $x^4 + yx^2 = 1$ (ii) $\sin^{-1}\left(\frac{2^{x+1}}{1+4^x}\right)$

Q.N19. Prove that $x = y^2$ and $xy = k$ cut at Right angle if $8k^2 = 1$

Q.N20. Prove that volume of the largest cone that can be inscribed in a sphere of radius R is

$\frac{8}{27}$ of Volume of Sphere.

Q.N21. Find integral of

1) $\int \cos 2x \cos 4x \cos 6x\, dx$ 2) $\int \frac{2-3\sin x}{\cos^2 x}\, dx$

Q.N22. A manufacturing company makes two types of teaching aids A and B of mathematics for class XII . Each type of A requires 9 labour hours for fabricating and 1 labour hours for finishing Each types of B requires 12 labour hours for fabricating and 3 labour hours for finishing. For fabricating and finishing the maximum labour hours available are 180 and 30 respectively. How many pieces of type A and B should be manufactured per week to get maximum profit. What is the maximum profit per week.

Is the teaching aid necessary for teaching learning process , if Yes, Justify your answer.

Q.N23. Find local Maxima and local minima If any of the following function. Find local maximum and local minimum values also.

$F(x) = \sin x - \cos x$, $0 \leq x \leq 2\pi$

Q.N24. Solve system of Linear Equations using matrix method.

$2x + 3y + 3z = 5$

$X - 2y + z = -4$

$3x - y - 2z = 3$

Q.N25. Consider f: $R \to (-5,\infty)$ is given by $f(x) = 9x^2 + 6x - 5$ show that f is invertible with

$$f^{-1}(y) = \frac{\sqrt{y+6} - 1}{3}$$

Q.N.26.If x, y , z are different and $\begin{vmatrix} x & x^2 & 1+x^3 \\ Y & y^2 & 1+y^3 \\ Z & z^2 & 1+z^3 \end{vmatrix} = 0$ then show that $1 + xyz = 0$