

SMT. YRM JUNIOR COLLEGE, KALWAKURTHY

Mathematics -I (B) E.M

Max.Time: 3 hrs.

Half-yearly-2011

Max. Marks: 75M

I. Answer all questions

10 x 2 = 20M

01. Find the equation of straight line passing through the point (3, -4) and making X and Y –intercepts which are in the ratio 2 : 3.
02. Find the value of 'p' if the straight lines $3x + 7y - 1 = 0$ and $7x - py + 3 = 0$ are mutually perpendicular.
03. Find fourth vertex of the parallelogram whose consecutive vertices are (2, 4, -1), (3, 6, -1) and (4, 5, 1).
04. Find the equation of the plane passing through the point (1, 1, 1) and parallel to the plane $x + 2y + 3z - 7 = 0$.
05. Compute $\lim_{x \rightarrow 0} \left(\frac{e^x - 1}{\sqrt{1+x} - 1} \right)$.
06. Find $\lim_{x \rightarrow -\infty} \left(\frac{2x+3}{\sqrt{x^2-1}} \right)$.
07. Find 'a' so that $f(x) = \begin{cases} ax+3 & \text{if } x < 3 \\ 3-x+2x^2 & \text{if } x \geq 3 \end{cases}$ is continuous at $x=3$.
08. If $x^3 + y^3 - 3axy = 0$ find $\frac{dy}{dx}$.
09. The radius of a circular plate is increasing in length at 0.01 cm/sec. what is the rate at which the area is increasing, when radius is 12 cm.
10. Find the points at which the tangent to the curve $y = x^3 - 3x^2 - 9x + 7$ is parallel to the x –axis.

II. Answer any five questions

5 x 4 = 20M

11. A (5, 3) and B (3, -2) are two fixed points. Find the equation of locus of P, so that the area of triangle PAB is 9 sq. units.
12. When the axes are rotated through an angle 45° , transformed equation of a curve is $17x^2 - 16xy + 17y^2 = 225$. Find the original equation.
13. Find the equation of the line perpendicular to the line $3x + 4y + 6 = 0$ and making an intercept -4 on the X –axis.
14. Find the derivative of the function $f(x) = \sin 2x$ from first principle.
15. If $y = a \cos x + (b + 2x) \sin x$, then show that $y'' + y = 4 \cos x$.

(P.T.O)

16. A man 6 ft. high walks at a uniform rate of 4 miles per hour away from a lamp 20 ft. high. Find rate at which length of his shadow increases. (1 mile=5280 ft.).
17. The displacement 's' of a particle traveling in a straight line in 't' seconds is given by $s = 45t + 11t^2 - t^3$. Find the time when the particle comes to rest.

III. Answer any five questions

5 x 7=35M

18. Find the equation of the straight line passing through (1, 2) and making an angle 60° with the line $\sqrt{3}x + y - 2 = 0$.
19. An angle between the pair of lines $ax^2 + 2hxy + by^2 = 0$ is θ then, show that
- $$\cos \theta = \frac{a+b}{\sqrt{(a-b)^2 + 4h^2}}$$
20. Find the angle between the lines joining the origin to the points of intersection of the curve $S = x^2 + 2xy + y^2 + 2x + 2y - 5 = 0$ and the line $3x - y + 1 = 0$.
21. If a ray makes the angles α, β, γ and δ with four diagonals of a cube then find $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma + \cos^2 \delta$.
22. Find the derivative of $(\sin x)^{\log x} + x^{\sin x}$ w.r.t. 'x'.
23. At any point 't' on the curve $x=a(t + \sin t)$, $y=a(1 - \cos t)$, find the lengths of tangent, normal, sub-tangent and sub-normal.
24. Find the angle between the curves $x^2 + 3y = 3$ and $x^2 - y^2 + 25 = 0$.

**ALL THAT WE ARE IS
THE RESULT OF WHAT
we have thought.**