



II Terminal examination 2004 - 05

Sub : Mathematics

M. Marks :100

Class : XI

Time : 3Hrs.

General instructions:

All questions are divided into three Parts. Attempt Part A and either of Part B
Or Part C.

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| 1. | What is a power set? Write the power set of $A = \{ 2, 3, 1 \}$. | 3 |
| 2. | Simplify $\frac{(2 + 3i)^2}{1 + i}$ (or) How many terms of 20, 18, 16,.... are needed to give sum zero ? | 3 |
| 3. | For what value of x the points (2, 3), (x,6) and (3,2) lie on a straight line? | 3 |
| 4. | In what ratio is the segment joining the points (2,3) and (4,1) divides the segment joining the points (1,2) and (4,3). | 3 |
| 5. | Prove that $\cos \alpha \cdot \cos(60^\circ - \alpha) \cos(60^\circ + \alpha) = \frac{1}{4} \cos 3\alpha$ | 3 |
| 6. | Prove that $\tan 8A - \tan 7A - \tan A = \tan 8A \tan 7A \tan A$ | 3 |
| 7. | Find the term independent of x in $\left(3x^2 - \frac{1}{3x} \right)^9$. | 3 |
| 8. | If the binomial expansion of $(m - nx)^{-3}$ is $1 + 9x + \dots$ find the values of m and n. | 3 |
| 9. | Using principle of mathematical induction prove that $4^n + 15n - 1$ is divisible by 9 for all $n \in N$. | 4 |
| 10. | Evaluate $x^4 + 4x^3 + 6x^2 + 4x + 9$ if $x = -1 + \sqrt{-2}$. (or) If a, b, c are in A.P. and x, y, z are in G.P. show that $x^{b-c} \cdot y^{c-a} \cdot z^{a-b} = 1$. | 4 |
| 11. | Find the value of k for which the equation $2x^2 + 3x + - 2 = 0$ and $3x^2 + 4kx + 2 = 0$ may have a common root. (or) Solve graphically : $x \geq -4, y \leq -4, x + 2y \geq 2$ and $x - y \geq 6$ | 4 |
| 12. | Find the vertex, axis, focus and latus rectum of the parabola $y^2 + 2x - 4y + 7 = 0$. | 4 |



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| 13. | Find the equation of the circle through the intersection of the circles $x^2 + y^2 - 8x - 2y + 7 = 0$ and $x^2 + y^2 - 4x + 10y + 8 = 0$ and passing through the point $(-1, -2)$. | 4 |
| 14. | Find the coordinates of the orthocenter of the triangle whose vertices are the points $(2, 6)$, $(1, 1)$ and $(3, 2)$. | 4 |
| 15. | Using truth table prove that $\sim(p \cup q) \cup (\sim p \cap q) = (\sim p)$ | 4 |
| 16. | Solve and find the general solution for $2 \sin^2 x + \sqrt{3} \cos x + 1 = 0$. | 4 |
| 17. | Prove that $2 \tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{7} = \frac{\pi}{4}$. | 4 |
| 18. | The coefficient of three consecutive terms in $(1 + x)^n$ are $1 : 7 : 42$ find the value of n and r . | 4 |
| 19. | Find standard deviation and variance for the given data: X : 5 10 15 20 25 F : 7 4 6 3 5 | 4 |
| 20. | The line $4x - 3y = -12$ is a tangent at the point $(-3, 0)$ and the line $3x + 4y = 16$ is the tangent at the point $(4, 1)$ to a circle. Find the equation of the circle. | 6 |
| 21. | a) Prove that ${}^n C_r + {}^n C_{r-1} = {}^{n+1} C_r$ b) An equilateral triangle is inscribed in the parabola $y^2 = 4ax$ with one vertex of the parabola. Find the length of the sides of the triangle. | 3 3 |
| 22. | a) Find the coefficient of x^6 in the e^{2x} . (or) Prove that $\frac{1}{2} - \frac{1}{2} \cdot \frac{1}{2^2} + \frac{1}{3} \cdot \frac{1}{2^3} - \frac{1}{4} \cdot \frac{1}{2^4} + \dots = \log \frac{3}{2}$ b) prove that $1 + \frac{3}{1!} + \frac{5}{2!} + \frac{7}{3!} + \dots \text{to } \infty = 3e$ (or) Prove that $\frac{1}{3.4} + \frac{1}{5.6} + \frac{1}{7.8} \dots = \log 2 - \frac{1}{2}$ | 3 3 |
| PART [B] | | |
| 23. | Determine the points on Z axis which is equidistant from the points $(1, 5, 7)$ and $(5, 1, -4)$. | 3 |
| 24. | $\vec{a} \rightarrow \vec{b} \rightarrow \vec{c} \rightarrow \vec{d} \rightarrow \vec{e}$ The side of a parallelogram are $2\vec{i} + 4\vec{j} - 5\vec{k}$ and $\vec{i} + 2\vec{j} + 3\vec{k}$. Find the unit vector parallel to the diagonal. | 4 |



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| 25. | If D is the mid point of side BC of a triangle ABC then prove that $\vec{AB} + \vec{AC} = 2 \vec{AD}$. | 3 |
| 26. | Find the coordinates of the foot of the perpendicular from the (1, 1, 1) to the line joining the points (5, 4 ,4) and (1,4,6). PART [C] | 4 |
| 23. | Find the annual dividend on 500 shares of a stock with par value of Rs. 10 each if the quarterly dividend is 6%. | 3 |
| 24. | . Mohan bought 50 debentures of Rs. 100 at 10% discount , the rate of interest being 10%. Find the rate of interest obtained and his stock. | 4 |
| 25. | Find the median for the following data : X :3 5 1 8 7 2 4 9 6 F :11 20 8 9 15 10 16 6 23 | 3 |
| 26. | Using simple aggregative method , construct the index number for the year 2003 taking year 2002 as the base year fir the given data: Commodity : A B C D E F G Price(in Rs.) 2002 : 40 30 20 15 60 90 80 Price (in Rs.) 2003 : 45 35 25 20 70 100 90 | 4 |
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