

MODEL TEST PAPER - II

Time: 3 hours

Maximum Marks: 100

General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper consists of 29 questions divided into four sections A, B and C. D Section A comprises of 4 questions of one mark each, section B comprises of 8 questions of 2 marks each and section C comprises of 11 questions of 4 marks each. And Section D comprises of 6 questions of six marks each.
- (iii) All questions in section A are to be answered in one word, one sentence or as per the exact requirement of the question.
- (iv) There is no overall choice. However internal choice has been provided in 4 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.
- (v) Use of calculator is not permitted.

SECTION A

1. Write the interval $[6, 12]$ in the set builder form
2. Find the 6th term in the expansions of $(2x - y)^{12}$

3. Find the length of latus rectum ellipse $\frac{x^2}{49} + \frac{y^2}{36} = 1$
4. A coin is tossed twice what is the probability that at least one head occurs?

SECTION-B

5. Solve the following trigonometric equation: $\tan 2\theta = \sqrt{3}$
6. Prove that : $\cos 4x = 1 - 8 \sin^2 x \cos^2 x$.
7. Reduce the following equation into intercept form and find the intercepts on the axes : $4x - 3y = 6$
8. Find the equation of the line passing through the point (3, 0) and perpendicular to the line $x - 7y + 5 = 0$.
9. Find the equation of the line whose perpendicular distance from the origin is 5 units and angle made by the perpendicular with positive axis is 30°
10. Find the multiplicative inverse of following complex number :
 $4 - 3i$
11. Write the contrapositive of the following statements :
- (i) If x is prime number, then x is odd.
 - (ii) If the two lines are parallel then they do not intersect in the same plane.
12. Write the negation of the following statements :
- (i) π is not a rational number.
 - (ii) Zero is a positive number.

SECTION-C

13. Find the equation of the hyperbola whose foci are $(\pm 3\sqrt{5}, 0)$ and length of latus rectum is 8.

OR

Find the equation of the circle with radius 5 whose centre lies on x-axis and passes through the point (2, 3).

14. Find the derivative of $\cot x$ with respect to x from first principle.

OR

Evaluate : $\lim_{x \rightarrow 0} f(x)$, when $f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0. \\ 0, & x = 0. \end{cases}$

15. Find the co-ordinates of a point on y-axis which is at a distance of $5\sqrt{2}$ from the point R(3, -2, 5)
16. Find the square root of $-15 - 8i$.

OR

Convert the complex number $\frac{1+3i}{1-2i}$ in polar form.

17. In how many of the distinct permutations of the letters in MISSISSIPPI do four I's not come together?

OR

How many words or without meaning can be formed with letters of the word EQUATION at a time so that vowels and consonants occur together ?

18. In an examination, a question paper consists of 12 questions divided into two parts i.e., Part I and Part II containing 5 and 7 questions respectively. A student is required to attempt 8 questions all, selecting at least 3 from each part. In how many ways can a student select the questions? Write one importance of examination.
19. In the binomial expansion of $(1 + x)^n$, the coefficient of the 5th, 6th, and 7th terms are in A.P. Find all the value of n for which this can happen.
20. Find the domain and range of the real function $f(x) = \frac{1}{1-x^2}$
21. The function f is defined by $f(x) = \begin{cases} 1-x, & x \leq 0 \\ 1, & x > 0 \end{cases}$ Draw the graph of $f(x)$.
22. If $\tan A - \tan B = x$
 $\cot B - \cot A = y$ Prove that : $\cot(A - B) = \frac{1}{x} + \frac{1}{y}$
23. In a class of 60 students, 30 opted of NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that
- the student opted for NCC or NSS.
 - the student has opted NSS but not NCC.

SECTION D

24. Prove the following by using the principle of mathematical induction for all $n \in \mathbb{N}$.
- $3^{2n+2} - 8n - 9$ is divisible by 8.

25. Solve the following system of inequalities graphically :

$$x + y \leq 4, y \leq 3, x + 5y \geq 4, 6x + 2y \geq 8, x \geq 0, y \geq 0$$

26. The ratio of the A.M and G. M of two positive numbers a and b be $m : n$ ($m > n$). Show that $a : b = \left(m + \sqrt{m^2 - n^2}\right) : \left(m - \sqrt{m^2 - n^2}\right)$

27. Prove that : $\cos^2 A \cos^2 A \frac{2}{3} \cos^2 A \frac{2}{3} 3$

$$\text{Prove that : } \left(1 + \cos \frac{\pi}{8}\right) \left(1 + \cos \frac{3\pi}{8}\right) \left(1 + \cos \frac{5\pi}{8}\right) \left(1 + \cos \frac{7\pi}{8}\right) = \frac{1}{8} + .$$

28. In a survey it was found that 21 people like product A, 26 people like product B and 29 like product C. If 14 people like product A and B. 15 people like product B and C. 12 people like product C and A and 8 people like all three products, find :

(i) How many people like a least one of the products?

(ii) How many people like product C only?

29. Find the mean variance and standard deviation for the following data

C.I.	0-10	10-20	20-30	30-40	40-50
Frequency	5	8	15	16	6

ANSWER OF MODEL TEST PAPER-II

1. $\{x : 6 \leq x \leq 12, x \in R\}$
2. $T_6 = -101376 x^7 y^5$
3. $\frac{72}{7}$ units
4. $\frac{3}{4}$
5. $\frac{n}{2} - \frac{1}{6}$
7. $\frac{x}{\left(\frac{3}{2}\right)} + \frac{y}{(-2)} = 1$; x-intercept is $\frac{3}{2}$ and Y-intercept is -2 .
8. $7x + y = 21$
9. $\sqrt{3}x + y = +10$
10. $z^{-1} = \frac{4 - 3i}{25}$
11. (i) If x is not odd then x is not prime.
(ii) If two lines intersect in the plane then they are not parallel in the same plane.
12. (i) π is a rational number
(ii) Zero is not a positive number.
13. $\frac{x^2}{25} - \frac{y^2}{20} = 1$
14. $-\operatorname{cosec}^2 x$ or LHL = -1 ; RHL = 1 so, $\lim_{x \rightarrow 0} f(x)$ does not exist.
15. $(0, 2, 0)$ or $(0, -6, 0)$
16. $\pm(1 - 4i)$
or $\sqrt{2} \left(\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4} \right)$
17. 33810 or 1440
18. 36750
19. $n = 7, 14$
20. $D(f) = R - \{-1, 1\}$; Range $(f) = (-\infty, 0) \cup [1, \infty]$
21. (i) $\frac{19}{30}$ (ii) $\frac{2}{15}$
28. (i) 43 (ii) 10