MODEL TEST PAPER-I

Time: 3 hours **Maximum Marks: 100**

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, section B comprises of 13 questions of 4 marks each and section C comprises of 7 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 have 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. Find the number of terms in the expansion of $(3x+y)^8-(3x-y)^8$.

2. Define 1 radian and convert it in degree measure.

3. Evaluate $\lim\limits_{x\to 0}\dfrac{\sin\dfrac{1}{x}}{\dfrac{1}{x}}$.

4. Find the argument of the complex number $Z=\left(\sin\dfrac{\pi}{6}+i\cos\dfrac{\pi}{6}\right)$

5. Let $f:C\to R$ be a function given by $f(x)=x^2+1$ and $f(\alpha)=-5$ then find α, where C and R are set of complex numbers respectively.

6. Find the eccentricity of ellipse whose length of major and minor axes are equal.

SECTION B

7. Draw the graph of the function $f(x)=|x+2|$. Write its domain and range.

8. Let U= {a, b, c, d, e, f, g, h, i, j, k}, A= {a, e, i}, B= {a, c, e, g, i, k} then find

   (i) $A\cap B$ (ii) B' (iii) all subsets of A

   (iv) Verify: $A\cap(A'\cup B)=A\cap B$

9. Prove that: $\sin 3x+\sin 2x-\sin x=4\sin x\cos\frac{x}{2}\cos\frac{3x}{2}$

OR

Prove that: $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}}=2\cos\theta$

10. Show that the statement "If x is real number such that $x^2+4x=0$ then x=0 is true by method of contrapositive. Also write its converse statement

11. How many four digit numbers more than 4000 can be formed using the digits 0, 2, 3, 4, 5 & 6 if the repetition of digits is allowed.

OR

If 5 parallel lines in a plane are intersected by a family of 6 parallel lines. Find the number of parallelograms formed.

12. Find the equation of line in general form joining the points $(at_1^2, 2at_1)$ *and* $(at_2^2, 2at_2)$.

13. Find the equation of parabola whose focus is (–3, 2) and equation of directrix is x+y=4

OR

Find the equation of image of the circle $x^2+y^2+8x-16y+64=0$ in the line mirror x=0.

14. Find the coordinates of the point which divides the line segment joining the points A(–2,0,6) and B(10,–6,–12) in the ratio 5:6 externally.

15. Find two numbers whose arithmetic mean is 34 and the geometric mean is 16.

16. Show that the coefficient of middle term in the expansion of $(1+x)^{2n}$ *is* $\frac{1.3.5.....(2n-1)}{n!}.2^n$.

17. Three dice are thrown simultaneously. Find the probability that two of them show the same face.

18. Let f(x) be a function defined by,

$$f(x)=\begin{cases}4x-5 & if\ \ x\le 2\\ x-\lambda & if\ \ x>2\end{cases}$$

Find the value of λ if $\lim_{x\to 2} f(x)$ exists.

19. If $y=\sqrt{\frac{x}{a}}+\sqrt{\frac{a}{x}}$, prove that $2xy\frac{dy}{dx}=\left(\frac{x}{a}-\frac{a}{x}\right)$

OR

Differentiate cosec x w.r.t. 'x' by first principle.

SECTION C

20. Solve graphically:

$2x+y\ge 4,\qquad x+y\le 3,\qquad 2x-3y\le 6,\qquad x\ge 0, y\ge 0$

21. Prove the following by using Principle of Mathematical Induction for all $n\in N$

$x^{2n}-y^{2n}$ is divisible by (x + y)

22. In a group of 84 persons, each plays at least one game out of these three, tennis, badminton and cricket. 28 of them play

cricket, 40 play tennis and 48 play badminton. If 6 play both cricket and badminton and 4 play tennis and badminton and no one play all the three games. Find the number of persons who play cricket but not tennis. What is the importance of games in student's life?

23. The mean of 5 observations is 4.4 and the variance is 8.24. If three of the observations are 1, 2 and 6. Find the other two observations.

OR

Find the coefficient of variation (C.V.) of the following data:

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

24. Solve: $\sin 2x - \sin 4x + \sin 6x = 0$

OR

If $\cos(\alpha+\beta)=\frac{4}{5}$ and $\sin(\alpha-\beta)=\frac{5}{13}$; $\alpha,\beta \in \left(0,\frac{\pi}{4}\right)$, then find the value of $\tan 2\alpha$.

25. Find the sum of the sequence: 7, 77, 777, 777… to n terms.

26. Represent the complex number $\frac{1+7i}{(2-i)^2}$ in polar form.

ANSWERS

1. 4.
2. Approx. 57°
3. Not defined or ∞
4. $\frac{\pi}{3}$
5. $\pm i\sqrt{6}$
6. e = 0
7. Domain = R, Range = [0, ∞)

8. (i) A

(ii) {*b, d, f, h, i*}

(iii) { }, {a}, {e}, {i}, {a,e}, {e,i}, {a,i} {a,e,i}

11. 647 **OR** 150

12. $2x-(t_1+t_2)y+2a\ t_1t_2=0$

13. $x^2-2xy+y^2+20x+10=0$

OR

$(x-4)^2+(y-8)^2=16$

14. (–62, 30, 96)

15. 4 and 64

17. $\frac{5}{12}$

18. $\lambda=-1$

19. – cosec x cot x

22. 6

23. 4 and 9 OR 22 .87

24. $x=\frac{n\pi}{4}\ \ or\ \ n\pi\pm\frac{\pi}{6},\qquad n\in Z$ OR $\frac{56}{33}$

25. $\frac{7}{9}\left[\frac{10(10^n-1)}{9}-n\right]$

26. $\sqrt{2}\left(\cos\frac{3\pi}{4}+i\sin\frac{3\pi}{4}\right)$