Model Test Paper 4

Time Allowed : 2½ hours *Max. Marks* : 80

General Instructions :

Attempt all questions from ***Section A*** *and any four questions from* ***Section B.***
All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.
Omission of essential working will result in loss of marks.
The intended marks for questions or parts of questions are given in brackets [ ]
Mathematical tables are provided.

SECTION - A (40 Marks)

(Attempt *all* questions from this Section)

Question 1 : Choose the correct answers to the questions from the given options: [15]

(i) For a transaction of ₹80,000 in Delhi, if GST rate is 18%, then SGST is :

(a) ₹7,200 (b) ₹14,400 (c) ₹6,400 (d) nil

(ii) The discriminant of the quadratic equation $x^2 - 2x + 1 = 0$:

(a) $= 0$ (b) > 0 (c) < 0 (d) none of these

(iii) The value of m so that $(x + 6)$ is a factor of $x^3 + 5x^2 - 4x + m$, is :

(a) 7 (b) –3 (c) 6 (d) 12

(iv) If a share of ₹100 is selling at ₹120, then it is said to be at :

(a) a discount of ₹20 (b) a premium of ₹20 (c) par (d) none of these

(v) Which term of the AP 72, 68, 64, ... is 0?

(a) 15 (b) 18 (c) 19 (d) 20

(vi) The progression $a_1, a_2, a_3 \ldots a_n$ forms an GP only if :

(a) $\frac{a_n}{a_{n-1}}$ = constant (b) $a_n - a_{n-1}$ = constant (c) $a_n \times a_{n-1}$ = constant (d) $\frac{a_{n-1}}{a_n}$ = constant

(vii) If in triangle ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar when :

(a) $\angle B = \angle E$ (b) $\angle A = \angle E$ (c) $\angle B = \angle D$ (d) $\angle A = \angle F$

(viii) If the curved surface area of a cylinder of height 14 cm is 88 sq cm, then the diameter of the cylinder is:

(a) 2 cm (b) 4 cm (c) 1 cm (d) 3 cm

(ix) If $4x - 2 \geq 8 - x$, $x \in N$, then the solution set is :

(a) {2, 3, 4, 5, ...} (b) {1, 2, 3, 4, ...} (c) {0, 1, 2, 3, ...} (d) {2, 3, 4, 5, 6}

(x) The probability of getting a sum of 13, when a pair of dice is rolled is:

(a) 0 (b) $\frac{1}{12}$ (c) $\frac{1}{13}$ (d) $\frac{1}{11}$

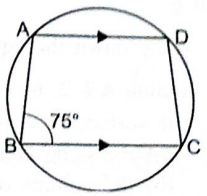
(xi) Order of matrix P is 2 × 1 and that of Q is also 2 × 1. The order of the matrix 2P – Q is:

(a) 2 × 2 (b) 4 × 1 (c) 2 × 1 (d) 3 × 2

(xii) The coordinates of a point which divides a line segment joining points (–3, 4) and (7, –6) in the ratio 1 : 2 internally, are :

(a) (–1, –3) (b) (1, 3) (c) $\left(\frac{1}{3}, \frac{2}{3}\right)$ (d) $\left(-\frac{1}{3}, \frac{-2}{3}\right)$

(xiii) In the given figure, ABCD is a cyclic trapezium such that AD || BC.
If $\angle ABC = 75°$, then $\angle BCD$ is:



(a) 35°
(b) 55°
(c) 65°
(d) 75°

(xiv) In a size transformation, the resulting figure is called:
(a) object (b) image (c) pre-image (d) reduction

(xv) The median of the data –11, 4, 9, –8, 0, 5, –1, is:
(a) 0 (b) –1 (c) –2 (d) 4

Question 2 :

(i) Manish deposits ₹2000 per month in a Recurring Deposit Account for $1\frac{1}{2}$ years at 8% p.a. Find the amount he will receive at the time of maturity. [4]

(ii) What least number must be added to each of the numbers 5, 11, 19 and 37 so that the resulting numbers are proportional? [4]

(iii) If $2\tan\theta = 5$, find the value of $\frac{3\sin\theta - 4\cos\theta}{\sin\theta + 4\cos\theta}$. [4]

Question 3 :

(i) The total surface area of a cylinder of radius 5 cm is 660 cm^2. Find the height of the cylinder. [4]

(ii) Harikishan invested ₹8,000 in 7% ₹100 shares at ₹80. After a year he sold these shares at ₹75 each and invested the proceeds (including his dividend) in 18% ₹25 shares at ₹41 each. Find : [4]
(a) his dividend for the first year
(b) his annual income in the second year
(c) the percentage increase in his return on his original investment

(iii) Use a graph paper for this ques0tion. [5]
(a) Plot the points A(0, 5), B(2, 5), C(5, 2), D(5, –2), E(2, –5) and F(0, –5).
(b) Reflect the points B, C, D and E on the y-axis and name them respectively as B′, C′, D′ and E′.
(c) Write the coordinates of B′, C′, D′ and E′.
(d) Name the figure formed by BCDEE′D′C′B′.

SECTION - B (40 Marks)

(Attempt *any four* questions from this Section)

Question 4 :

(i) A dealer in Mumbai sold a refrigerator to a consumer in Mumbai for ₹21,500. If the rate of GST is 18%, find: [3]
(a) IGST (b) CGST (c) SGST

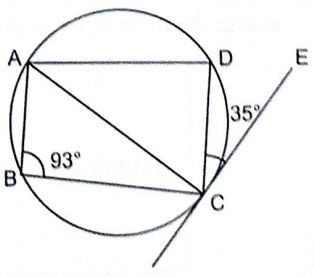
(ii) If the roots of the equation $2x^2 - 2cx + ab = 0$ be real and distinct, prove that the roots of $x^2 - 2(a + b)x + (a^2 + b^2 + c^2) = 0$ will be imaginary. [3]

(iii) The 2nd and 5th terms of a GP are $-\frac{1}{2}$ and $\frac{1}{16}$ respectively. Find the sum of first 8 terms of the GP. [4]

Question 5 :

(i) Find x and y if : $3\begin{bmatrix} 5 & -6 \\ 4 & x \end{bmatrix} - \begin{bmatrix} 6 & y \\ 0 & 6 \end{bmatrix} = 3\begin{bmatrix} 3 & -2 \\ 4 & 0 \end{bmatrix}$ [3]

(ii) In the given figure, CE is a tangent to the circle at point C. ABCD is a cyclic quadrilateral. If $\angle ABC = 93°$ and $\angle DCE = 35°$, [3]



find :
(a) $\angle ADC$
(b) $\angle CAD$
(c) $\angle ACD$

(iii) Using factor theorem, show that $(x - 2)$ is a factor of $2x^3 - 5x^2 + 4x - 4$. [4]

Question 6 :

(i) Write down the equation of the line whose gradient is $\frac{3}{2}$ and which passes through P, where P divides the line segment joining A (–2, 6) and B (3, – 4) in the ratio 2 : 3. [3]

(ii) The surface area of a solid is 5 m^2, while the surface area of its model is 20 cm^2. Find [3]

(a) the scale factor

(b) the volume of the solid if the volume of the model is 100 cm^3.

(iii) How many terms of the AP 7, 11, 15, 19, 23, ... must be taken to get the sum 250? [4]

Question 7 :

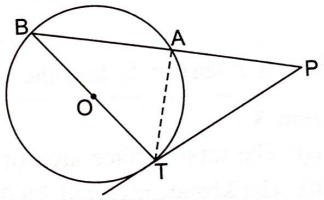
(i) A large firm employs 4250 employees. One person is chosen at random. What is the probability that the person's birthday is on Monday in the year 2016? [3]

(ii) A cylindrical can whose base is horizontal and of radius 3.5 cm contains sufficient water so that when a sphere is placed in the can, the water just covers the sphere. Given that the sphere just fits into the can, calculate : [3]

(a) the total surface area of the can in contact with water when the sphere is in it.

(b) the depth of water in the can before the sphere was put into the can.

(iii) In the given figure, PAB is a secant and PT a tangent to the circle with centre O. If $\angle ATP = 40°$, PA = 9 cm and AB = 7 cm. [4]



Find:

(a) $\angle APT$ (b) length of PT

Question 8 :

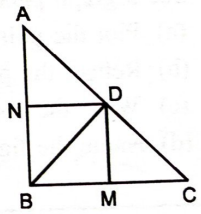
(i) Solve the following inequation and represent your solution on the real number line: [3]

$$-5\frac{1}{2} - x \leq \frac{1}{2} - 3x \leq 3\frac{1}{2} - x,\ x \in R$$

(ii) Calculate the mean daily wage of a worker from the following table : [3]

Daily wages (in ₹)	40–45	45–50	50–55	55–60	60–65
No. of workers	2	3	7	12	6

(iii) In the figure, ABC is a right triangle with $\angle ABC = 90°$, BD ⊥ AC, DM ⊥ BC and DN ⊥ AB. Prove that [4]



(a) $DM^2 = DN \times MC$ (b) $DN^2 = DM \times AN$

Question 9 :

(i) Draw an ogive for the following frequency distribution : [6]

Class	6500–7000	7000–7500	7500–8000	8000–8500	8500–9000	9000–9500	9500–10000
Frequency	10	18	22	25	17	10	8

From the ogive find the median.

(ii) Draw a line segment AB = 10 cm. Mark C, the mid-point of AB. Draw and describe the locus of a point which is (i) 2 cm from AB (ii) 4 cm from C. Mark the points E, F, G, H which satisfy both the above conditions. [4]

(a) Describe the figure EFGH. (b) What kind of triangle is ECF?

Question 10 :

(i) Draw a regular hexagon of side 3.5 cm. Circumscribe a circle to it. [3]

(ii) Solve for x, using the properties of proportion: $\frac{3x+\sqrt{9x^2-5}}{3x-\sqrt{9x^2-5}} = 5$ [3]

(iii) A boy standing on the bank of a river observes that the angle subtended by a tree on the opposite bank is 60°. When he moves 20 m back from the bank, he finds the angle to be 30°. Find the height of the tree and the breadth of the river. [4]