F.M. : 80

Time: 2½ hrs

Total Qs. : 10

Section - A [40 Marks]
(Attempt all questions from this Section)

Question -1

Choose the correct answer to the questions from the given options. (Do not copy the questions.
Write the correct answer only)

(1×15=15)

(i) The next term of the AP $\sqrt{8}, \sqrt{18}, \sqrt{32}$............is

   (a) $\sqrt{52}$ (b) $\sqrt{46}$ (c) $\sqrt{50}$ (d) $\sqrt{54}$

(ii) If $A = \begin{bmatrix} 5 \\ -3 \end{bmatrix}$, $B = \begin{bmatrix} -1 \\ 7 \end{bmatrix}$ and $A+2X = B$ then $X =$

   (a) $\begin{bmatrix} -3 \\ 5 \end{bmatrix}$ (b) $\begin{bmatrix} 2 \\ 2 \end{bmatrix}$ (c) $\begin{bmatrix} 3 \\ 5 \end{bmatrix}$ (d) $\begin{bmatrix} -6 \\ 10 \end{bmatrix}$

(iii) The angle of elevation of the top of a 90m tall tower from a point $30\sqrt{3}$m away from its foot is

   (a) 45°   (b) 30°   (c) 60°   (d) 90°

(iv) In what ratio does the X- axis divides the join of the points $A(2,-3)$ and $B(5,6)$

   (a) 2:3   (b) 3:5   (c) 1:2   (d) 2:1

(v) A dice is thrown once. The probability of getting a prime number is

   (a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

(vi) The quadratic equation $5x^2 + 10x + k = 0$ has equal roots, then value of k is

   (a) 5   (b) -5   (c) $\frac{1}{2}$ (d) $\frac{5}{2}$

(vii) A solid cone and a right circular cylinder have equal base area and volume. If height of the cone is 18cm, then height of the cylinder is

   (a) 54cm   (b) 12cm   (c) 6cm   (d) 24cm

(viii) If coordinates of point P on reflecting on the X – axis are (3,5), then coordinates of the point P on reflecting in the origin is
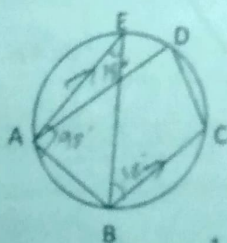
   (a) (-3,5)   (b) (3,-5)   (c) (-3,-5)   (d) (3,5)

(ix) Median class of the given distribution is

Class Interval	0---10	10---20	20---30	30---40	40---50
Frequencies	3	2	5	5	8

   (a) 10---20   (b) 20---30   (c) 30---40   (d) 40---50

(x) In the adjacent diagram AE is parallel to BC. If $\angle AEB = 38°$ and $\angle EAB = 82°$ then $\angle ADC$ is equal to

   (a) 60°   (b) 38°   (c) 82°   (d) 98°

(xi) The solution set of the inequation $x + \frac{1}{2} \leq 5$, $x \in W$ is

   (a) {1,2,3,4}   (b) {0,1,2,3}   (c) $\{0,1,2,3,4\frac{1}{2}\}$ (d) {0,1,2,3,4}

(xii) If x, 3 and y are in continued proportion then

   (a) $x^2y^2 = 9$ (b) $xy = 6$ (c) $x^2y^2 = 81$ (d) $x+y = 9$

(xiii) If one of the roots of the quadratic equation is 0.0773.The root of the equation correct to two significant figure is

   (a) 0.07   (b) 0.08   (c) 0.077   (d) 0.1

(xiv) In the diagram given below straight lines AB and CD intersect at P and AC ∥ BD, then $\frac{PB}{BD}$ is equal to

   (a) $\frac{5}{4}$ (b) $\frac{6}{5}$ (c) $\frac{3}{2}$ (d) $\frac{4}{5}$
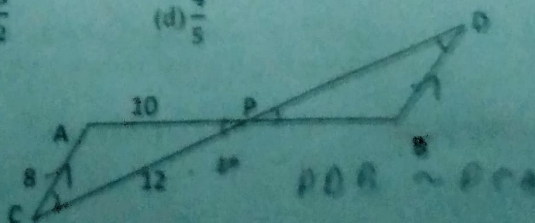
(xi) If x-2 is a factor of the polynomial $2x^3 - x^2 - px - 2$, then value of p is

(a) 13   (b) 5   (c) -5   (d) 11

Question - 2

[4×3=12]

(i) Rahul deposits Rs. 1200 every month in a recurring deposit account for 2 years. If he gets Rs. 30750 at the time of maturity, find the rate of interest.

(ii) 6 is the mean proportional between two numbers x and y and 48 is the third proportional to x and y. Find the numbers.

(iii) Prove that : $\dfrac{CosA}{1-SinA} - \dfrac{1-SinA}{CosA} = 2\,tanA$

Question - 3

[4+4+5=13]

(i) The inner circumference of a right circular cylindrical pipe is 22 cm. Find

(a) The inner radius of the pipe.

(b) The volume of the material in 14cm length of the pipe.

$(\text{Take} = \dfrac{22}{7})$

6cm

(ii) Equation to a line passing through point (4,2) is $2x - 3y + k = 0$. Find the value of k, hence find the slope and the Y- intercept of the line.

(iii) Use graph paper for this question.

Take 2cm =1 unit on both x and y axes.

(a) Plot the points A(2,4) and B(0,2) on the graph sheet.

(b) Reflect the point A in the line y = 2 and name as C.

(c) Reflect the point B in the line AC and name as D.

(d) Reflect figure ABCD in the origin and name as A'B'C'D'.

(e) Assign a special name to the quadrilateral ABCD and calculate its area in *square cm.*
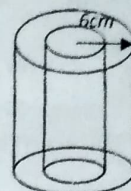
Section - B [40 Marks]
(Attempt any four questions from this Section)

Question - 4

[3+3+4=10]

(i) The following bill shows rates and the marked price of the articles.

ARTICLES	Marked price (in Rs)	GST
Medicines	950	6%
A pair of shoes	3500	28%

Calculate the amount to be paid for the above bill.

(ii) Solve the following Quadratic Equation and give your answer correct to two places of decimals:

$x^2 + 11x + 3 = 0$

(iii) Draw a Histogram for the given data using a graph paper. Take 2cm =Rs. 500 units on the X- axis and 2cm =5 workers on the Y – axis. Estimate the mode from the graph.
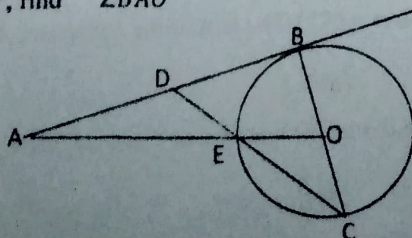
Weekly wages (in Rs.)	3500--4000	4000—5000	5000--5500	5500--6000	6000--6500
Number of workers	8	25	15	10	13

Question - 5

[3+3+4=10]

(i) If $A = \begin{bmatrix} 2 & 1 \\ 0 & -2 \end{bmatrix}$; $B = \begin{bmatrix} 4 & 1 \\ -3 & -2 \end{bmatrix}$; $C = \begin{bmatrix} -3 & 2 \\ -1 & 4 \end{bmatrix}$. Find $A^2 + AC - 5B$

(ii) In the figure given below, o is the centre of the circle and AB is a tangent to it at point B. If $\angle BDC = 65°$, find $\angle BAO$

(iii) Use the Remainder Theorem to factorize the polynomial $2x^3 + x^2 - 13x + 6$

(i) ABCD is a square where B(1,3) and D(4,2) are the end points of the diagonal BD. Find :-
  (a) the coordinates of the point of intersection of the diagonals AC and BD.
  (b) the equation of the diagonal AC.

(ii) Prove that : $(1 + CotA)^2 + (1 - CotA)^2 = 2 Cosec^2A$

(iii) The first and the last term of an AP are 7 and 502 and the common difference is 5. Find the following for the given AP :-
  (a) the number of terms "n".
 (b) sum of the "n" terms.

Question - 7

(i) A box contains some green, yellow and white balls. The probability of selecting a green ball is $\frac{1}{4}$ and that of an yellow ball is $\frac{1}{3}$. If the box contains 10 white balls, find ;
  (a) total number of balls in the box.
  (b) probability of selecting a white ball.

(ii) A toy is in the form of a cone of base diameter 12cm surmounted on the plane surface of a hemisphere of the same diameter. If total height of the toy is 14 cm,
  (a) calculate the surface area of the toy.(take $\pi = 3.14$)
  (b) if the toy is melted and recast into a solid cylinder of radius 5cm calculate the height of the cylinder.
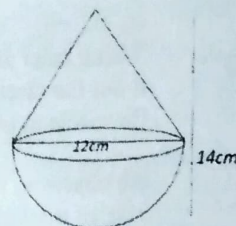
(iii) In the following figure AB is a diameter. The tangent at point C meets AB produced at Q. If $\angle CBA = 56°$, find ;
  (a) $\angle BCQ$
  (b) If QC = 8cm and QB = 4cm find the length of the radius of the circle.
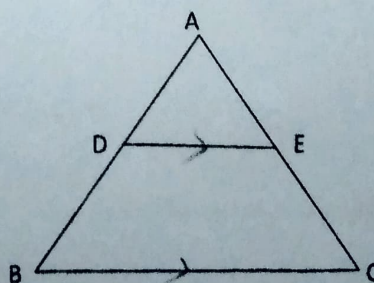

$4 + 6$
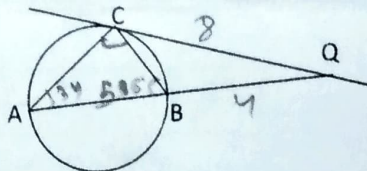
Question - 8

(i) Solve the following inequation , write the solution set and represent the solution set on the real number line.

$$-\frac{x}{3} - 4 \le \frac{x}{2} - \frac{7}{3} < \frac{7}{6}, x \in R$$

(ii) In the adjoining figure DE ∥ BC and D divides AB in the ratio 2:3. Find :

(a) $\frac{AE}{BC}$

(b) $\frac{DE}{AC}$

(c) DE, if BC = 7cm.

Question - 9

(i) For the same amount of work, A takes 6 hours less than B. If together they can complete work 13 hours 20 minutes, find how much time will B take to complete the work alone.

(ii)   The monthly income of a group of 320 employee is given below :

Monthly income in Rs.(thousands)	6—7	7—8	8—9	9—10	10—11	11—12	12—13
Number of employees	20	45	65	95	60	30	5

Draw an ogive of the given distribution on a graph sheet taking $2cm$ = Rs.1000 on one axis and $2cm$ = 50 employees on the other. From the ogive determine;
(a) the median wage.
(a) the number of employees whose income is below Rs.8500
(c) if the salary of a senior employee is above Rs.11,500, find the number of senior employees in the company.
(d) the inter – quartile range of wages.

Question- 10   [3+3+4=10]

(i)   Solve the following equation for x using properties of proportion:
$$\frac{\sqrt{3x+4} + \sqrt{3x-5}}{\sqrt{3x+4} - \sqrt{3x-5}} = 9$$

(ii)   Using ruler and compasses only construct a circle of radius $2.5cm$ with centre o. Mark a point P out the circle such that OP = $6cm$. Through the point P draw two tangents to the circle touching the circle at points A and B. Measure and record the lengths of PA and PB.

(iii)   As observed from the top of a $80m$ tall light house, the angle of depression of two ships, on the same side of the light house in horizontal line with the base, are $30°$ and $40°$ respectively. Find the distance between the two ships. Give your answer correct to the nearest meter.