

Time: 3 hrs.

MM: 80

Total no. of questions 38

Total no. of pages :6

General Instructions :

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section **A** has 20 MCQs carrying 1 mark each
3. Section **B** has 5 questions carrying 02 marks each.
4. Section **C** has 6 questions carrying 03 marks each.
5. Section **D** has 4 questions carrying 05 marks each.
6. Section **E** has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All questions are compulsory. However, an internal choice in 2 questions of 5 marks, 2 questions of 3 marks and 2 questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required.

SECTION A

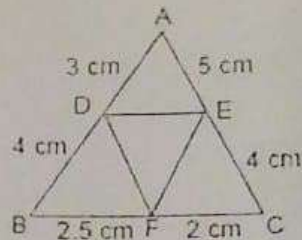
(Section A consists of 20 questions of 1 mark each)

Q1	The distance of the point $P(-3, -4)$ from the x -axis (in units) is: (a) 3 (b) -3 (c) 4 (d) 5
Q2	In the given figure, the positions of the observer and the object are mentioned, the angle of depression is: (a) 30° (b) 90° (c) <u>60°</u> (d) 45°
Q3	In an AP, if $d = -4$, $n = 7$ and $a_n = 4$, then a is equal to: (a) 6 (b) 7 (c) 20 (d) <u>28</u>
Q4	If the centre of a circle is $(3, 5)$ and end points of a diameter are $(4, 7)$ and $(2, y)$, then the value of y is: (a) 3 (b) -3 (c) 7 (d) 4
Q5	Which of the following statement is false? (a) All equilateral triangles are similar. (b) All quadrilateral are similar. (c) All circles are similar. (d) None of the above
Q6	Ratio of volumes of two cones with same radii is: (a) $h_1 : h_2$ (b) $s_1 : s_2$ (c) $r_1 : r_2$ (d) <u>None of these</u>
Q7	If $\cos A = \frac{2}{5}$, the value of $4 + 4 \tan^2 A$ will be: (a) 1 (b) 2 (c) 4 (d) <u>25</u>
Q8	The n th term of the AP $a, 3a, 5a, \dots$ is: (a) na (b) <u>$(2n - 1)a$</u> (c) $(2n + 1)a$ (d) $2na$

Q9

In the given figure, $AD = 3$ cm, $AE = 5$ cm, $BD = 4$ cm, $CE = 4$ cm, $CF = 2$ cm, $BF = 2.5$ cm, then

- (a) $DE \parallel BC$
 (b) $DF \parallel AC$
 (c) $EF \parallel AB$
 (d) none of these



Q10

The median and mode respectively of a frequency distribution are 26 and 29, then its mean is:
 (a) 28.4 (b) 24.5 (c) 27.5 (d) 25.8

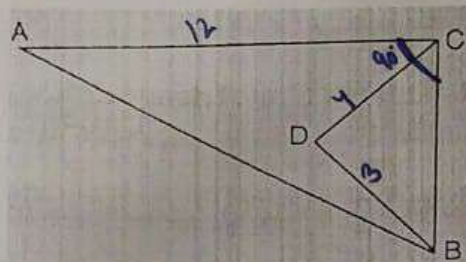
Q11

If the perimeter of a semicircular protractor is 36 cm, then its diameter is:
 (a) 10 cm (b) 12 cm (c) 14 cm (d) 15 cm

Q12

In the given figure, $\angle ACB = 90^\circ$, $\angle BDC = 90^\circ$, $CD = 4$ cm, $BD = 3$ cm, $AC = 12$ cm, then $\cos A - \sin A$ is equal to:

- (a) $5/12$
 (b) $5/13$
 (c) $7/12$
 (d) $7/13$



Q13

If $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$, ($\theta \neq 90^\circ$), then the value of $\tan \theta$ is:
 (a) $\sqrt{2} - 1$ (b) $\sqrt{2} + 1$ (c) $\sqrt{2}$ (d) $-\sqrt{2}$

Q14

In $\triangle ABC$, $DE \parallel BC$, $AD = x$, $AE = x + 2$, $DB = x - 2$ and $EC = x - 1$ (in cms) then value of x is:
 (a) 2 cm (b) 4 cm (c) 5 cm (d) 1 cm

Q15

The cumulative frequency table is useful in determining:
 (a) Mean (b) Median (c) Mode (d) All of these

Q16

A wire is looped in the form of a circle of radius 28 cm. It is re-bent into a square form, then the length of the side of the square is:
 (a) 42 cm (b) 44 cm (c) 46 cm (d) 48 cm

Q17

HCF of the smallest composite number and smallest prime number is:
 (a) 4 (b) 2 (c) 1 (d) 0

Q18

The probability that a leap year selected at random contain 53 Monday is:
 (a) $53/366$ (b) $1/7$ (c) $2/7$ (d) $53/365$

DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
 (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.

Q19

Assertion: $(2x - 1)^2 - 4x^2 + 5 = 0$ is not a quadratic equation.
Reason: An equation of the form $ax^2 + bx + c = 0$, $a \neq 0$, where $a, b, c \in \mathbb{R}$ is called a quadratic equation.

Assertion: $\frac{13}{3125}$ is a terminating decimal fraction.

Reason: If $q = 2^m 5^n$ where m, n are non-negative integers, then $\frac{p}{q}$ is a terminating decimal fraction.

SECTION B

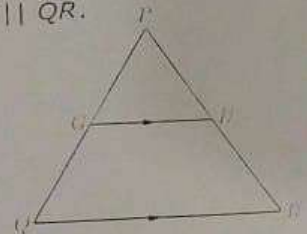
(Section B consists of 5 questions of 2 marks each)

Q21 If $\sqrt{3}\sin\theta - \cos\theta = 0$ and $0^\circ < \theta < 90^\circ$, find the value of θ .

OR

If $x = 3 \sin\theta + 4 \cos\theta$ and $y = 3 \cos\theta - 4 \sin\theta$ then find the value of $x^2 + y^2$.

Q22 In the given figure, G is the mid-point of the side PQ of ΔPQR and $GH \parallel QR$. Prove that H is the mid-point of the side PR of the ΔPQR .



Q23 A box contains cards numbered 11 to 123. A card is drawn at random from the box. Find the probability that the number of the drawn card is

- (a) A perfect square number
- (b) A multiple of 7.

OR

All red face cards are removed from a pack of playing cards. The remaining cards were well shuffled and then a card is drawn at random from them. Find the probability that the drawn card is

- (a) a red card
- (b) a face card

Q24 Find the discriminant of the given quadratic equation and comment on the nature of roots.

$$\sqrt{3}x^2 - 5x + \sqrt{3} = 0$$

Q25 The 5th term of an AP is 26 and its 10th term is 51. Find the AP

SECTION C

(Section C consists of 6 questions of 3 marks each.)

Q26 Find the mode of the following frequency distribution:

Class	0-6	6-12	12-18	18-24	24-30
Frequency	7	5	10	12	6

Q27 The diagonal of a rectangular field is 16 metres more than the shorter side. If the longer side is 14 metres more than the shorter side, then find the lengths of the sides of the field.

OR

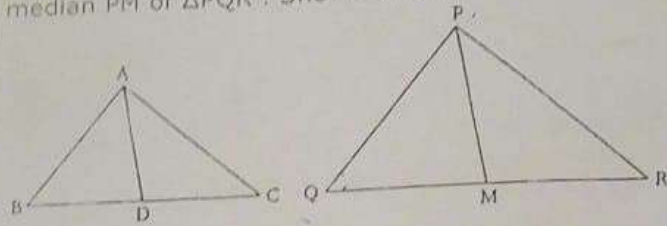
Solve the following quadratic equation for x :

$$x^2 - 2ax - (4b^2 - a^2) = 0$$

Q28 Prove that $\sqrt{7}$ is an irrational number.

Q29 Prove that "If a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio".

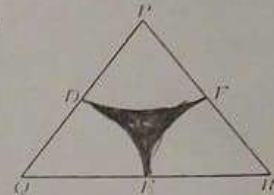
Q30 Sides AB and BC and median AD of a ΔABC are respectively proportional to sides PQ and QR and median PM of ΔPQR . Show that $\Delta ABC \sim \Delta PQR$.



Q31 Three horses are tied each with 7 m long rope at three corners of a triangular field having sides 20 m, 34 m and 42 m. Find the area of the plot which can be grazed by the horses.

OR

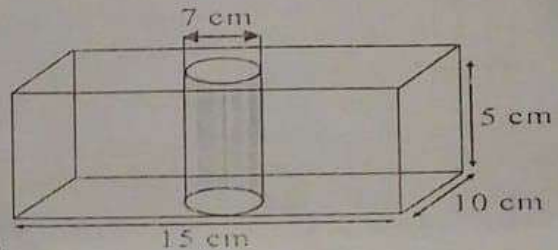
In the given figure, ΔPQR is an equilateral triangle of side 8 cm and D, E, F are centres of circular arcs, each of radius 4 cm. Find the area of shaded region. (Use $\pi = 3.14$ and $\sqrt{3} = 1.732$)



SECTION D

(Section D consists of 4 questions of 5 marks each)

Q32 From a cuboidal solid metallic block of dimensions 15cm X 10cm X 5cm a cylindrical hole of diameter 0.07m is drilled out. Find the surface area of the remaining block.



OR

A container shaped right circular cylinder having base radius 6cm and heights 15cm, is full of ice cream. The ice cream is to be filled into cones of height 12cm, and radius 3cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice cream.

Q33 Prove that: $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{cosec} A + \cot A$.

Q34 A vertical tower stands on a horizontal plane and is surmounted by a flagstaff of height 5 m. From a point on the ground the angles of elevation of top and bottom of the flagstaff are 60° and 30° respectively. Find the height of the tower and the distance of the point from the tower. (take $\sqrt{3} = 1.732$)

Q35 The mean of the following frequency distribution is 62.8 and the sum of all the frequencies is 50. Compute the missing frequencies f_1 and f_2 .

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequencies	5	f_1	10	f_2	7	8

OR

The median of the following data is 525. Find the values of x and y , if the total frequency is 100.

Class interval	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
frequency	2	5	x	12	17	20	y	9	7	4

SECTION E

Case study-based questions are compulsory.
(Section E consists of 3 questions of 4 marks each)

(Each question has 3 parts with mark(s) 1+1+2 with choice in 2 marks question)

Q36

While investigating different job opportunities, Arun finds that firm A will start with initial salary of ₹ 25,000 per month for one year and guarantee him a raise of ₹ 1,200 each year whereas firm B will start with initial salary of ₹ 28,000 per year but will guarantee him a raise of only ₹ 800 each year.

Based on the above information, answer the following questions.

- (a) Over a period of 15 years, how much would Arun receive from firm A?
- (b) Over a period of 15 years, how much would Arun receive from firm B?
- (c) What would be his annual salary at firm A for the tenth year?

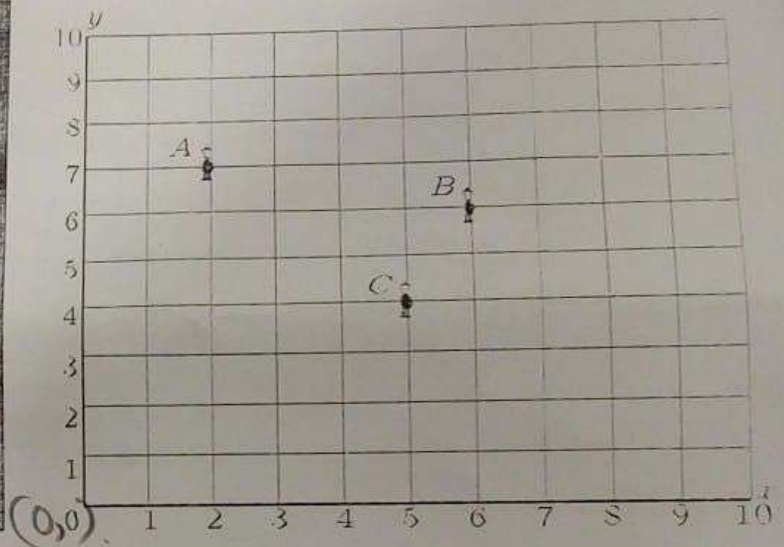
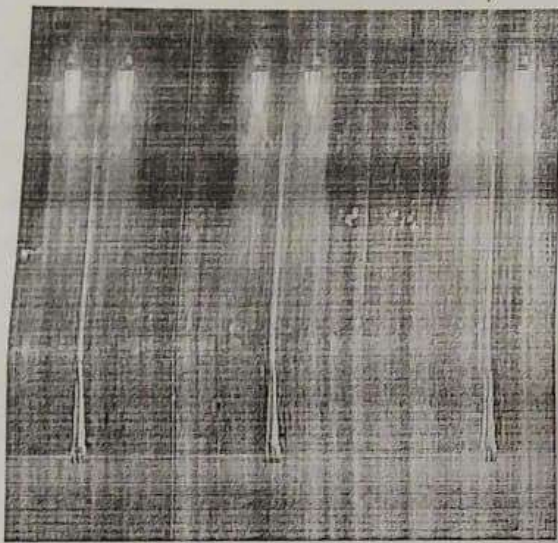
OR

What would be his annual salary at firm B for the tenth year



Q37

Resident Welfare Association (RWA) of a Gulmohar Society in Delhi have installed three electric poles A, B and C in a society's common park. Despite these three poles, some parts of the park are still in dark. So, RWA decides to have one more electric pole D in the park.



The park can be modelled as a coordinate system given above.

Based on the above information, answer the following questions.

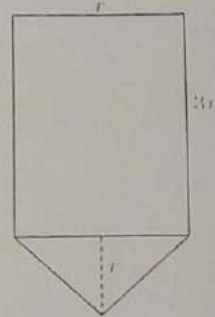
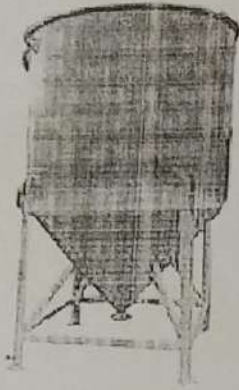
- (a) What is the position of the pole C?
- (b) What is the distance of the pole B from the corner O of the park?
- (c) Find the position of the fourth pole D so that four points A, B, C and D form a parallelogram.

OR

What is the distance between poles A and C?

Q38

Conical Tank: The advantages of cone bottom tanks are found in nearly every industry, especially where getting every last drop from the tank is important. This type of tank has excellent geometry for draining, especially with high solids content slurries as these cone tanks provide a better full-drain solution. The conical tank eliminates many of the problems that flat base tanks have as the base of the tank is sloped towards the centre giving the greatest possible full-drain system in vertical tank design.



Rajesh has been given the task of designing a conical bottom tank for his client. Height of conical part is equal to its radius. Length of cylindrical part is the 3 times of its radius. Tank is closed from top. The cross section of conical tank is given above.

Based on the above information, answer the following questions.

- If radius of cylindrical part is taken as 3 meters, what is the volume of above conical tank?
- What is the area of metal sheet used to make this conical tank? Assume that tank is covered from top.
- What is the ratio of volume of cylindrical part to the volume of conical part?

OR

The cost of metal sheet is ₹ 2000 per square meter and fabrication cost is 1000 per square meter. What is the total cost of tank?