



2018 VI 18

0230

Seat No. :

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Time : 2½ Hours

MATHEMATICS (E)

Subject Code

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Total No. of Questions : 8

(Printed Pages : 7)

Maximum Marks : 80

- INSTRUCTIONS:**
- Answer **each** main question on a **fresh** page.
 - All** questions are **compulsory**.
 - The question paper consists of **eight** questions, each of **10** marks.
 - There is no overall choice. However, internal choice has been provided in **three** questions of **three** marks **each**.
 - In questions on constructions, the drawing should be **clear** and **exactly** as per the given measurements. The construction lines and arcs should also be maintained.
 - Graph** paper will be supplied on **request**.
 - Use** of calculator and mathematical tables is **not permitted**.

1. A) Select and write the most appropriate alternative from those given below :

If α and β are the zeroes of a quadratic polynomial $2x^2 - 5x - 7$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta} =$ _____ [1]

a) $\frac{5}{7}$

b) $\frac{7}{5}$

c) $\frac{-5}{7}$

d) $\frac{-7}{5}$

B) Use Euclid's division algorithm to find the HCF of 81 and 135. [2]

C) Assuming that $\sqrt{7}$ is an irrational number, prove that $5 - 4\sqrt{7}$ is also an irrational number. [3]

D) If two zeroes of the polynomial $3x^4 - 10x^3 - 17x^2 + 30x + 24$ are $\sqrt{3}$ and $-\sqrt{3}$, then find the other two zeroes. [4]



2. A) Select and write the most appropriate alternative from those given below : [1]

A box contains some discs which are numbered from 5 to 15. If one disc is drawn at random from the box, then the probability of getting a multiple of 3 or 4 is _____.

a) $\frac{6}{11}$

b) $\frac{5}{11}$

c) $\frac{3}{10}$

d) $\frac{7}{10}$

B) A die and a coin are thrown once simultaneously. Find the probability of getting : [2]

i) A prime number and a head

ii) A number greater than 4 and a tail.

C) Find the roots of **ANY ONE** of the following quadratic equations. [3]

i) $4x^2 + 11x - 20 = 0$ (By Factorisation method)

ii) $4x^2 + 12x - 7 = 0$ (By using quadratic formula)

D) A group of students planned a picnic and estimated the expenditure to be ₹ 5,000. Five more students joined the group so the expenditure was increased by ₹ 1,000, but the average expenses per student was decreased by ₹ 10. Find the total number of students who went for the picnic. [4]

3. A) Select and write the most appropriate alternative from those given below : [1]

A car takes 'y' hours to travel from a city A to city B with a speed of 'x' km/hour, then the distance between the two cities can be written as _____ km.

a) $x + y$

b) $\frac{x}{y}$

c) $x \cdot y$

d) $\frac{y}{x}$

B) The numerator of a fraction is greater than the denominator by 2. If 1 is added to the numerator the value of the fraction becomes 2.

Represent the above statements by two linear equations in x and y. [2]



C) Find the solution of **ANY ONE** of the following linear equations : [3]

i) $2x + 5y = -4$

$3x - 2y = 13$ (By Elimination method)

ii) $3x + 2y = 6$

$4x - 3y = 25$ (By Cross-multiplication method)

D) Find the solution of the following pair of linear equations graphically. [4]

$x - y = 7$ and $3x + 2y = 6$

Rewrite and complete the following tables.

$x - y = 7$

$3x + 2y = 6$

x			
y			

x			
y			

(Plot atleast 3 points for each line using a graph paper)

4. A) Select and write the most appropriate alternative from those given below : [1]

The sum of first 'n' terms of an A.P. whose first term is 8 and the last term is 62, is 700. Therefore the A.P. consists of _____ terms.

a) 15

b) 20

c) 25

d) 30

B) The following table shows the weight of 30 students of a class.

Weight (kg)	No. of students
35-40	5
40-45	7
45-50	11
50-55	7

Find the median of the above data upto two decimal places. [2]

C) A man started saving money from the first week of January 2017. He saved ₹ 25 in the first week, ₹ 40 in the second week, ₹ 55 in the third week and so on, till the last week of December 2017. Find the total saving of the man in the year 2017. [3]



- D) The distribution given below shows the daily wages of the employees working in a factory : [4]

Wages (Rs.) C.I.	No. of employer f_i	Class-mark x_i	Deviation $d_i = x_i - a$	$f_i d_i$
300-350	5	—	—	—
350-400	9	—	—	—
400-450	16	—	—	—
450-500	9	—	—	—
500-550	5	—	—	—
550-600	6	—	—	—
	$\Sigma f_i = 50$		$\Sigma f_i d_i =$	

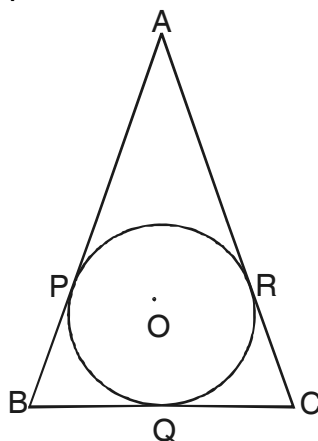
Taking the class-mark denoted by 'a' of the class interval (400-450) as the assumed mean, rewrite and complete the table and also find the mean of the daily wages by the assumed mean method.

5. A) Select and write the most appropriate alternative from those given below : [1]

PA and PB are tangent segments drawn from external point 'P' to a circle with centre 'O' at A and B respectively. If $\angle AOB$ and $\angle APB$ are in the ratio 3 : 2, then $\angle APO =$ _____°.

- a) 72
- b) 36
- c) 108
- d) 90

- B) Given : A circle with centre 'O' is inscribed in $\triangle ABC$, where $AB = AC$. The sides AB, BC and AC touches the circle at points P, Q and R respectively. Prove that : 'Q' is a mid-point of BC.





C) Draw a circle with centre 'A' and radius 3.5 cm, then take a point 'P' at a distance of 8.5 cm from the centre of the circle. Using a pair of compasses and ruler, construct two tangent segments PX and PY to the circle. Measure and state the length of tangent segments. [3]

D) Using a pair of compasses and ruler, construct $\triangle ABC$ with sides $AB = 6.5$ cm, $BC = 7.2$ cm and $\angle ABC = 60^\circ$. Then construct $\triangle A'BC'$ whose sides are $\frac{3}{4}$ of the corresponding sides of $\triangle ABC$. [3]

6. A) Select and write the most appropriate alternative from those given below : [1]

If $3 \sin A - 4 \cos A = 0$, then the value of $\tan A =$ _____.

a) $\frac{7}{4}$

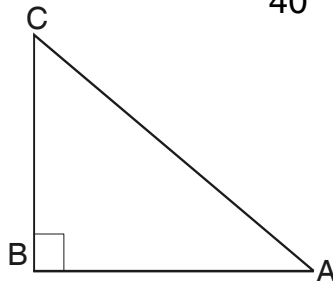
b) $\frac{4}{7}$

c) $\frac{4}{3}$

d) $\frac{3}{4}$

B) Attempt **ANY ONE** of the following : [3]

i) In $\triangle ABC$, if $\angle ABC = 90^\circ$ and $\tan A = \frac{9}{40}$.



Find :

- a) The length of AC
- b) The value of $\sec A$
- c) The value of $\sin C$.

ii) Evaluate the following expression using known numerical values of trigonometrical ratios :

$$2\sin^2 60^\circ - 6 \cot^2 45^\circ + 5 \operatorname{cosec}^2 30^\circ.$$

C) Prove the following identity. [2]

$$\sqrt{\frac{1 - \sin A}{1 + \sin A}} = \sec A - \tan A$$

D) i) If the points $A(6, 1)$, $B(8, 2)$, $C(9, 4)$ and $D(x, y)$ are the vertices of a parallelogram, taken in order, find the value of x and y . [2]

ii) Find the area of the triangle whose vertices are $A(-5, 7)$, $B(4, -5)$ and $C(4, 5)$. [2]



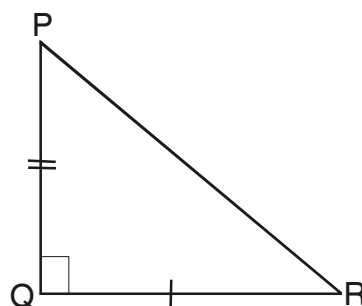
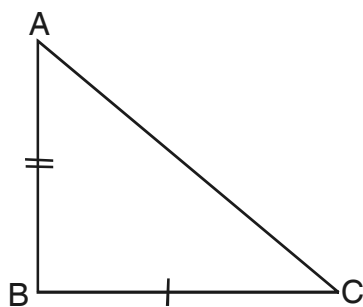
7. A) Select and write the most appropriate alternative from those given below : [1]

In $\triangle ABC$, points P and Q are on sides AB and AC respectively such that $PQ \parallel BC$. If $AP : PB = 1 : 2$ and $ar(\triangle APQ) = 6$ sq.units, then $ar(\square PBCQ) =$ _____ sq. units.

- a) 12
- b) 18
- c) 36
- d) 48

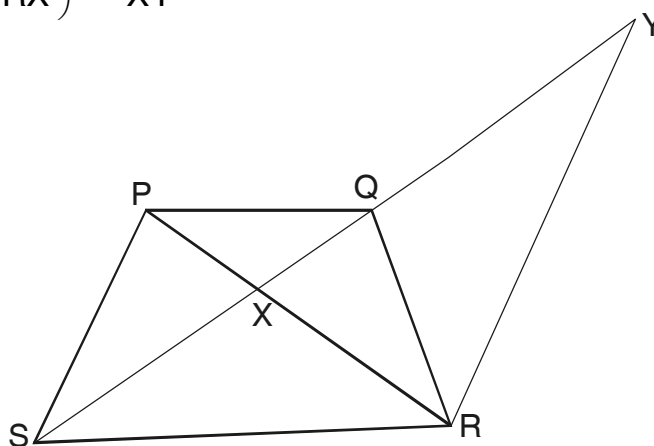
B) With reference to the given figure and given condition, write only the proof with reasons of the following theorem. In $\triangle ABC$, $AB^2 + BC^2 = AC^2$ and $\triangle PQR$ is constructed such that $PQ = AB$, $QR = BC$ and $\angle Q = 90^\circ$. [3]
Prove that :

$\triangle ABC$ is right angled triangle.



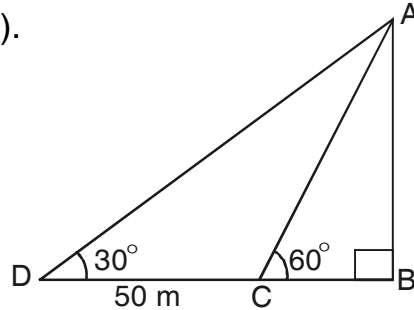
C) Given : In $\square PQRS$, $PQ \parallel SR$, diagonals PR and QS intersect at X, line through R parallel to PS intersect diagonal SQ on producing at Y. (S – Q – Y).

Prove that : $\left(\frac{PX}{RX}\right)^2 = \frac{QX}{XY}$. [3]





- D) The shadow of a tower AB, standing on a level ground is found to be 50 m longer when the sun's altitude is 30° than when it is 60° find the height of the tower (take $\sqrt{3} = 1.73$). [3]



8. A) Select and write the most appropriate alternative from those given below :

i) If the area of a circle is numerically equal to twice the circumference then its radius is _____ cm. [1]

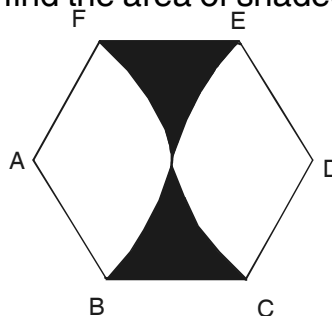
- a) 16
- b) 8
- c) 4
- d) 2

ii) The total surface area of a right circular cylinder with radius of its base 3 cm and height 2 cm is _____ sq.cm. [1]

- a) 15π
- b) 30π
- c) 18π
- d) 36π

- B) A container, opened from the top and made up of a metal sheet, is in the form of a frustum of a cone of height 21 cm, with radii of its lower and upper ends 6 cm and 10 cm respectively. Find the volume of the container (Take $\pi = \frac{22}{7}$) [2]

- C) In the given figure, ABCDEF is a regular hexagon of side 10 cm. Taking AB and DE as radii two sectors are drawn as shown in the figure. Taking $\pi = 3.14$ and $\sqrt{3} = 1.73$, find the area of shaded region. [3]



- D) A metallic ball of radius 10.5 cm is melted and recast into 126 cones of equal size. If the height of the cones formed is 3 cm, then find the radius of the each cone formed (Take $\pi = \frac{22}{7}$). [3]