2018 IV 04 **0930** **Seat No. :** | | | | | |

Time : 2½ Hours **MATHEMATICS (E)**

Subject Code

S	0	2	1

Total No. of Questions : 8 **(Printed Pages : 8)** **Maximum Marks : 80**

INSTRUCTIONS *:*

*i) Answer **each** main question on a **fresh** page.*
*ii) **All** questions are **compulsory**.*
*iii) The question paper consists of **8** questions, **each** of **10** marks.*
*iv) There is no overall choice. However, internal choice has been provided in **3** questions of **3** marks **each**.*
*v) 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**.*
*vi) **Graph** paper will be supplied on request.*
*vii) **Use** of calculator and Mathematical tables is not **permitted**.*

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

If α and β are the zeroes of the polynomial $x^2 + 6x + 5$ then $(\alpha + \beta)^2 =$ _____

a) -36 b) -6 c) 6 d) 36

B) Using Euclid's division algorithm find the H.C.F. of 255 and 867. **[2]**

C) Assuming that $\sqrt{5}$ is an irrational number, prove that $2 + 3\sqrt{5}$ is also an irrational number. **[3]**

D) If $\sqrt{3}$ and $-\sqrt{3}$ are the zeroes of the polynomial $2x^4 - 3x^3 - 5x^2 + 9x - 3$. Find the other two zeroes of the polynomial. **[4]**

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

One card is drawn from a well shuffled deck of 52 cards. The probability of getting a face card is _____

a) $\frac{1}{52}$ b) $\frac{3}{52}$ c) $\frac{3}{13}$ d) $\frac{1}{4}$

B) A die is thrown once. Find the probability that the number appears on the top face of the die is **[2]**

i) a prime number

ii) more than 4.

C) Find the roots of **any one** of the following quadratic equations : **[3]**

i) $8x^2 - 14x + 5 = 0$ (By factorisation method)

ii) $2x^2 - 7x + 3 = 0$ (By completing the square method).

D) Find two consecutive odd positive integers, sum of whose squares is 394. **[4]**

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

If $7x + 3y = 11$ and $3x + 7y = -1$ then $x - y =$

a) 3 b) 4 c) 10 d) 12

B) The following is a pair of linear equations in two variables :

$7x - 5y = 4$ and

$14x + ky = -4$.

Answer the following questions with reference to the given pair of equations : **[2]**

i) Write down the condition for unique solutions.

ii) Find the value of k.

C) Find the solution of **any one** of the following pair of linear equations : **[3]**

i) $2x + 3y = 5$ and

$3x + 4y = 6$ (By elimination method)

ii) $x - 4y = 11$ and

$2x + 5y = -4$ (By cross-multiplication method)

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

$2x + y = 7$ and

$x + 2y = 8$

Rewrite and complete the following tables.

$2x + y = 7$ $x + 2y = 8$

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 12 th term of the arithmetic progression 9, 14, 19, 24 ..... is _____
a) 45 b) 46 c) 54 d) 64

B) The following table shows the daily income of 50 workers : **[2]**

Daily Income (in Rs.)	Number of Workers
100 – 400	18
400 – 700	15
700 – 1000	10
1000 – 1300	7

Find the Median of the above given data.

C) A man bought a scooter with 12 monthly instalments. He paid ₹ 6,000 as first instalment and thereafter for each instalment he paid ₹ 250 less than the previous month. By instalment if he paid ₹ 3,150 extra over the original price, then find the original price of the scooter. **[3]**

D) The following table shows the marks scored by 40 students in Mathematics :

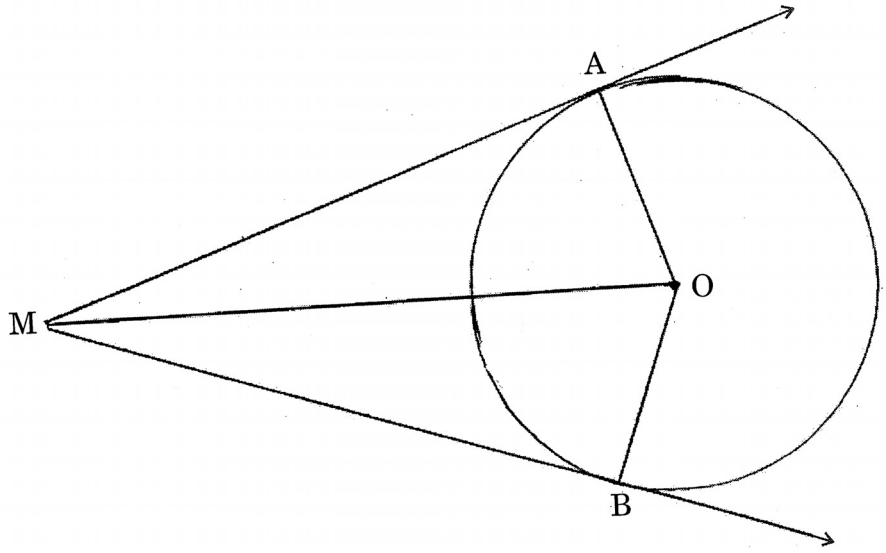
Marks Scored (C.I.)	No. of Students (f_i)	Class Mark (x_i)	Deviation $d_i = x_i - a$	$f_i d_i$
0 – 10	2	–	–	–
10 – 20	5	–	–	–
20 – 30	14	–	–	–
30 – 40	9	–	–	–
40 – 50	6	–	–	–
50 – 60	4	–	–	–
Total	$\sum f_i = 40$			$\sum f_i d_i =$ __

Taking the class mark denoted by 'a' of the class-interval 20 – 30 as the assumed mean, rewrite and complete the table and also find the mean of the marks by the assumed mean method. **[4]**

5. A) Select and write the most appropriate alternative from those given below : **[1]**
RP and RQ are tangent segments drawn from an external point R to a circle with centre O. If $\angle QRO = 35°$ then the measure of $\angle POQ =$ _____

a) 55° b) 70° c) 110° d) 145°

B) Given : Point O is the centre of a circle. MA and MB are two tangent segments drawn from an external point M to the circle at A and B respectively. Prove that : MA = MB. **[3]**



(Write only the proof with reasons)

C) Draw a circle with centre O and radius 2.7 cm. Take a point P at a distance 8.5 cm from the centre of the circle. Using a pair of compasses and ruler, construct two tangents PS and PT to the circle. Measure and state the length of the tangent segments. **[3]**

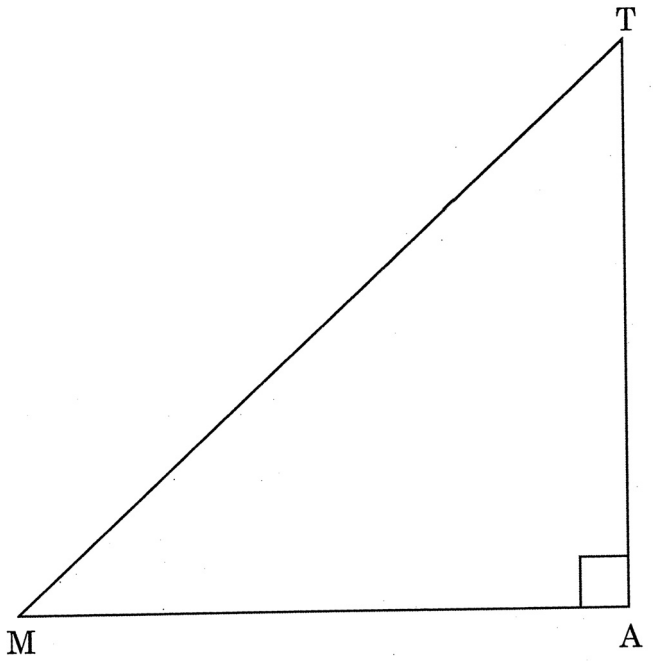
D) Using a pair of compasses and ruler, construct ΔABC with sides AB = 8 cm, BC = 9.5 cm and AC = 6.5 cm. Then construct $\Delta A'BC'$ whose sides are $\frac{3}{4}$ of the corresponding sides of ΔABC. **[3]**

6. A) Select and write the most appropriate alternative from those given below : **[1]**
If ΔABC is right angled at C, then the value of sin (A + B) = _____

a) 0 b) 1 c) $\frac{1}{2}$ d) $\frac{\sqrt{3}}{2}$

B) Attempt **any one** of the following : **[3]**

i) In Δ MAT, $\angle A = 90°$ and $\tan M = \frac{24}{7}$, then find :



a) The length of MT

b) The value of cos M

c) The value of sec T.

ii) Evaluate the following expression using known numerical values of trigonometric ratios :
$5 \sin^2 30° - 4 \cos^2 30° + 6 \cot^2 60°$.

C) Prove the following identity : **[2]**

$$\sqrt{\frac{1-\cos A}{1+\cos A}} = \operatorname{cosec} A - \cot A$$

D) Attempt the following :

i) Find the coordinate of the point which divides the line segment joining the points (2, –1) and (–3, 4) internally in the ratio 3 : 2. **[2]**

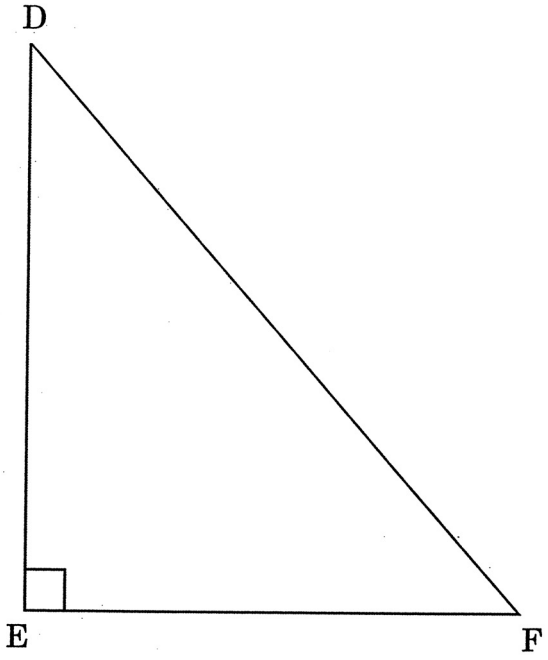
ii) Find the area of Δ PQR whose vertices are P (5, 2), Q (–3, 7) and R (2, –4). **[2]**

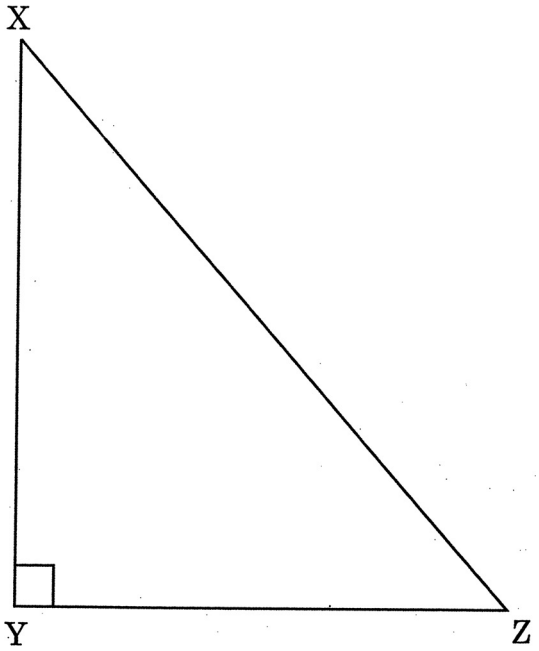
7. A) Select and write the most appropriate alternative from those given below : **[1]**

$\Delta ABC \sim \Delta PQR$ and $ar(\Delta ABC) = 144\ cm^2$, $ar(\Delta PQR) = 81\ cm^2$. If $QR = 27$ cm then $BC =$ _____ cm.

a) 9 b) 12 c) 36 d) 48

B) With reference to the given figure and the given conditions write only the proof with reason of the following theorem. **[3]**





Given : In ΔDEF, $DE^2 + EF^2 = DF^2$

ΔXYZ is constructed such that :

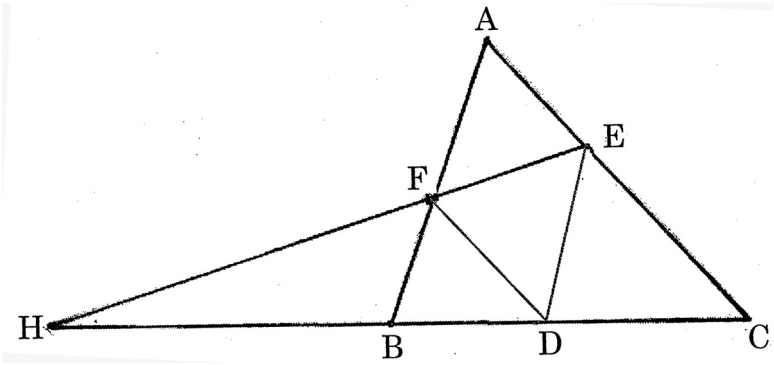
$XY = DE$, $YZ = EF$ and $\angle Y = 90°$.

Prove that :

ΔDEF is a right angled triangle.

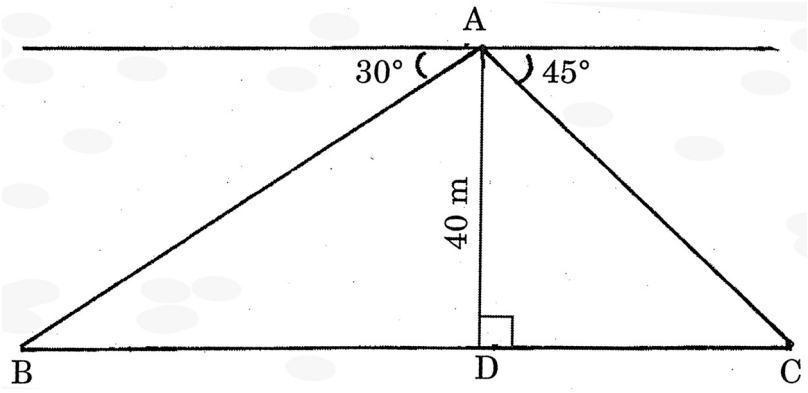
C) Given : D is any point on side BC of ΔABC. DE || AB and DF || AC. A – F – B and A – E – C. EF and CB meet at H when produced as shown in the fig. Prove that : **[3]**

$HD^2 = HB \times HC$



(Write only the proof with reasons)

D) From a point A on a bridge across a river BC, the angle of a depression of the banks on opposite sides of river, B and C are 30° and 45° respectively. If the bridge is at a height of 40 m as shown in the fig., find the width of the river BC. $(\sqrt{3} = 1.732)$ **[3]**



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

i) The area of the circle that can be inscribed in a square of side 8 cm is _____ **[1]**

a) 8π b) 16π c) 32π d) 64π

ii) If the surface area of a sphere is 196π cm^2, then its radius is _____ cm. **[1]**

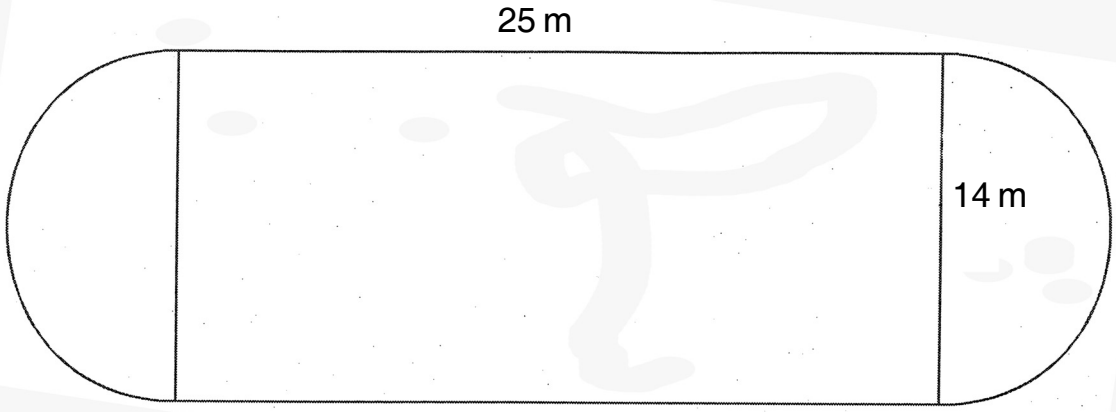
a) 7 b) 9 c) 11 d) 13

B) Attempt the following :

i) Find the area swept in one minute by a minute hand of a clock of length 12 cm. (Do not substitute for π) **[1]**

ii) Find the curved surface area of a right circular cylinder of diameter 7 cm and height 11 cm. (Take $\pi = \frac{22}{7}$). **[1]**

C) A flower bed in the form of a rectangle of dimensions 25 m × 14 m with semicircles on the outerside of the shorter sides of the rectangle as shown in the fig. Calculate the number of rose plants that can be planted if each plant requires 2m × 2m area. **[3]**



D) A right circular cylinder having radius 6 cm and height 15 cm is full of ice-cream. The ice-cream is to be filled in cones of height 12 cm and radius 3 cm having a hemispherical top. Find the number of such cones that are required to empty the cylinder. (Take $\pi = \frac{22}{7}$). **[3]**

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