2019 IV 08 **0930** **Seat No.** | | | | | |

Time : 2½ Hours **MATHEMATICS (E)**

Subject Code

S	0	2	1

Total No. of Questions : 8 **(Printed Pages : 13)** **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 *three* 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 is provided at the last page of the main answer booklet.

(*vii*) Use of calculator and Mathematical tables is not permitted.

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

The product of two numbers is 864. If their HCF is 12, then their LCM is .....

(*a*) 12

(*b*) 72

(*c*) 852

(*d*) 876

(B) Attempt the following : 2

(*i*) Find the sum of the zeroes of the quadratic polynomial $2x^2 - 7x - 15$.

(*ii*) Find the zeroes of the quadratic polynomial $x^2 - 11x$.

(C) On dividing the polynomial $2x^3 - 5x^2 + 8x - 5$ by a polynomial $g(x)$, the quotient and remainder are $(2x - 3)$ and $(3x - 2)$ respectively. Find $g(x)$. 3

(D) Prove that $\sqrt{7}$ is an irrational number. 4

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

If P(E) = 0.07, then the probability of getting an event "not E" is .....

(*a*) 0.03

(*b*) 0.93

(*c*) 1.00

(*d*) 1.07

(B) A card is drawn from a well shuffled deck of 52 playing cards. Find the probability of getting : 2

(*i*) an Ace

(*ii*) a red face card.

(C) Find the roots of ANY ONE of the following quadratic equations : 3

(*i*) $7x^2 - 17x + 6 = 0$ (by factorisation method)

(*ii*) $3x^2 + 10x - 8 = 0$ (by quadratic formula method)

(D) Two pipes A and B running together can fill a tank in $3\frac{1}{3}$ minutes. If pipe B takes 5 minutes more than pipe A to fill the tank separately, then find the time in which each pipe would fill the tank separately. 4

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

Three years hence, the ages of two friends will be x and y years respectively. Therefore the sum of their ages two years ago was ..... years.

(*a*) $x + y + 10$

(*b*) $x + y + 5$

(*c*) $x + y - 10$

(*d*) $x + y - 5$

(B) The following is a pair of linear equations in two variables : 2

$2x + 3y = 7$

$(k + 1)x + (2k - 1)\ y = 4k + 1.$

Answer the following questions with reference to the given pair of equations :

(*i*) Write down the condition for infinitely many solutions.

(*ii*) Find the value of k.

(C) Find the solution of ANY ONE of the following pair of linear equations : 3

(*i*) $3x - 2y = 5$ and

$5x + 3y = 21$ (By elimination method)

(*ii*) $2x + 5y = 29$

$7x - 2y = 4$ (By cross-multiplication method)

(D) Find the solution of the following pair of linear equations graphically : 4

$x + y = 8$ and

$3x - y = 4$

Rewrite and complete the following tables :

$x + y = 8$

x			
y			

$3x - y = 4$

x			
y			

(Plot at least 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 20 odd natural numbers is .....

(*a*) 100

(*b*) 210

(*c*) 400

(*d*) 420

(B) The following table shows the ages of 50 people in a locality : 2

Ages in Years	**Number of People**
5—15	10
15—25	12
25—35	15
35—45	13

Find the Median of the above given data.

(C) A factory manufacturing electric bulbs increases the production uniformly by a fixed number every month. If in the third month the production is 600 electric bulbs and in the seventh month the production is 800 electric bulbs, then find the total production of electric bulbs in the year. 3

(D) The following table shows the donation collected by a club from 60 donors : 4

Donation in ₹ (C.I.)	**No. of Donors (f_i)**	**Class Mark (x_i)**	**Deviation $d_i = x_i - a$**	$f_i d_i$
0—20	5	—	—	—
20—40	12	—	—	—
40—60	14	—	—	—
60—80	15	—	—	—
80—100	8	—	—	—
100—120	6	—	—	—
Total	$\Sigma f_i = 60$			$\Sigma f_i d_i$ = —

Taking the class-mark denoted by 'a' of the class interval (40–60) as the assumed mean, rewrite and complete the table. Also find the mean of the donation by the assumed mean method.

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

TP and TQ are tangents drawn from an external point T to a circle with centre O, at P and Q respectively. If $\angle POQ = 130°$, then the measure of $\angle PTO$ = ...

(*a*) 25°

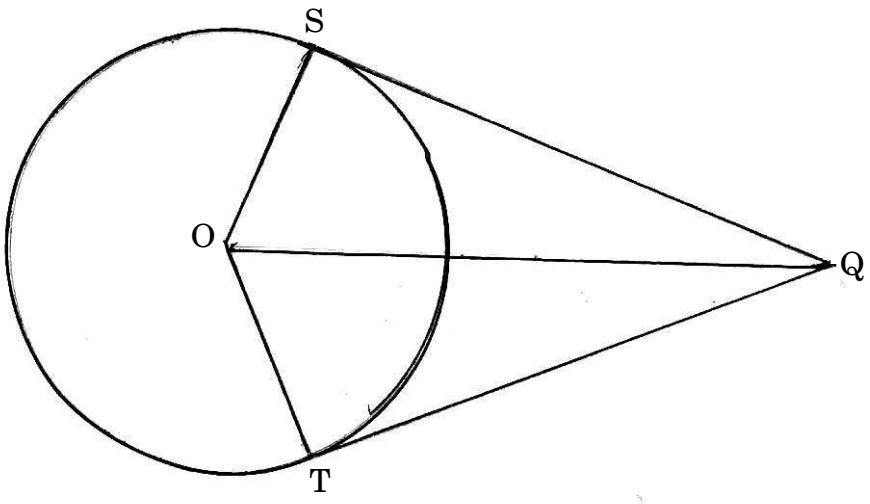
(*b*) 50°

(*c*) 65°

(*d*) 130°

(B) Given : Point O is the centre of a circle. QS and QT are two tangent segments drawn from an external point Q to the circle at S and T respectively. Prove that : 3

$$QS = QT$$



(Write only the proof with reasons)

(C) Draw a circle with centre O and radius 3.5 cm. Take a point P at a distance of 8 cm from the centre of the circle. Using a pair of compasses and ruler construct two tangents PA and PB to the circle. Measure and state the length of the tangent segments. 3

(D) Using a pair of compasses and ruler construct Δ PQR with sides PQ = 7 cm, QR = 8.5 cm and PR = 6.5 cm. Then construct $\Delta P'QR'$ whose sides are $\frac{3}{5}$ of the corresponding sides of ΔPQR. 3

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

If cosec 3A = sec (A – 22) where 3A is an acute angle, then the measure $\angle A$ = ...

(*a*) 11°

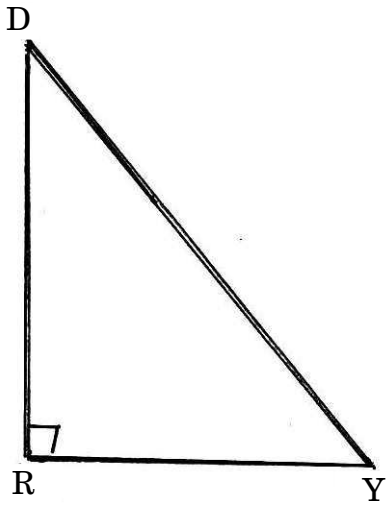
(*b*) 17°

(*c*) 28°

(*d*) 58°

(B) Attempt ANY ONE of the following : 3

(*i*) In Δ DRY, $\angle R = 90°$ and cosec Y = $\frac{17}{8}$:



Find :

(*a*) the length of YR

(*b*) the value of cot D

(*c*) the value of cos Y

(*ii*) Evaluate the following expression using known numerical values of trigonometric ratios :

$$3 \tan^2 30° - 2 \sec^2 45° + \frac{1}{3}\cos 60°.$$

(C) Prove the following identity : 2

$$\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \sec \theta + \tan \theta.$$

(D) Attempt the following :

(*i*) Find the area of triangle ABC whose vertices are A(4, 3), B(12, 5) and C(4, 6). 2

(*ii*) Find the value of k, if the point P(3, 4) is equidistant from the points A(5, k) and B(k, 7). 2

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

In Δ ABC, points D and E are on the sides of BC and AC respectively such that B–D–C, A–E–C and DE || AB. If CE = 4 cm, AE = 5 cm and BD = 4.5 cm, then BC = ... cm

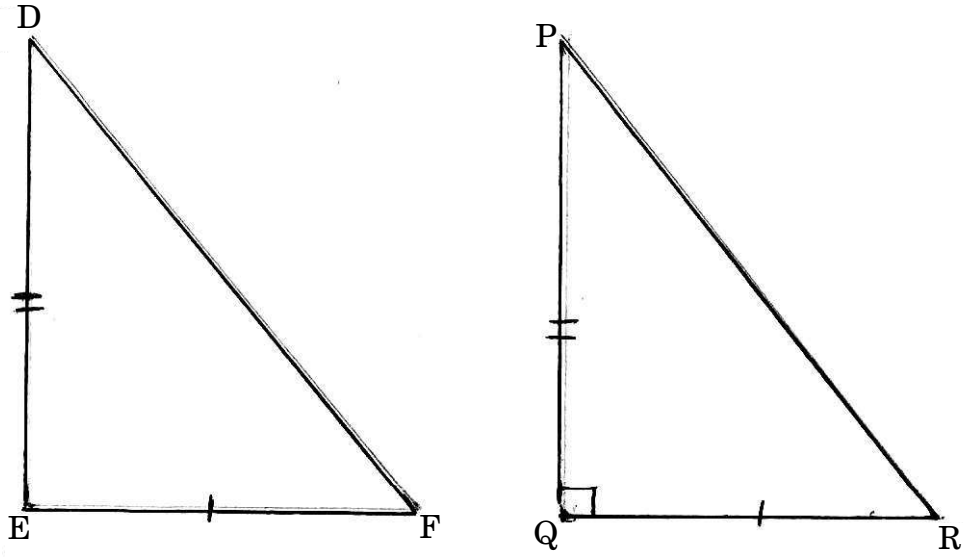
(*a*) 3.6

(*b*) 5.6

(*c*) 8.1

(*d*) 9

(B) With reference to the given figure and the given conditions, write only the proof with reasons of the following theorem : 3



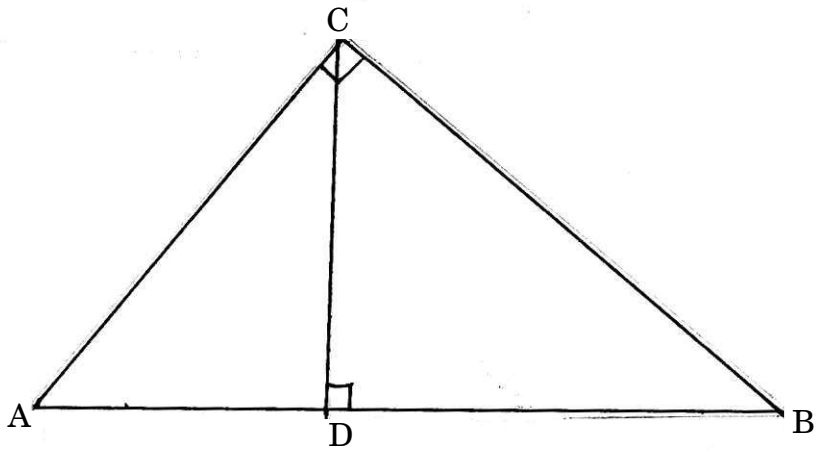
Given : In ΔDEF, $DE^2 + EF^2 = DF^2$, Δ PQR is constructed such that PQ = DE, QR = EF and $\angle Q = 90°$.

Prove that : ΔDEF is a right-angled triangle.

(C) Given : ΔABC is a right-angled triangle, right angled at C. Line segment CD is drawn perpendicular to side AB of ΔABC. 3

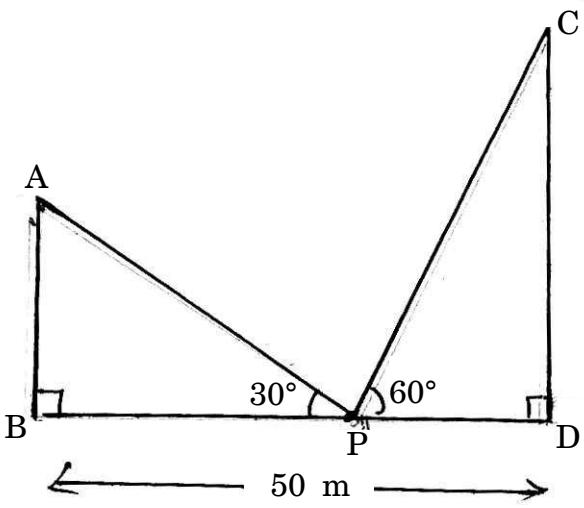
Prove that :

$$\frac{1}{CD^2} = \frac{1}{BC^2} + \frac{1}{AC^2}$$



(Write only the proof with reasons).

(D) Two pillars AB and CD are 50 m apart and the height of pillar CD is double the height of pillar AB as shown in the figure. From a point P on the line joining the feet of the pillars, an observer observes the top A of the pillar AB and top C of the pillar CD at angles of elevation 30° and 60° respectively. Find the height of the pillar AB and pillar CD. (Take $\sqrt{3} = 1.7$) 3



8. (A) Select and write the most appropriate alternative from those given below : 2

(*i*) The length of an arc of a circle of radius 15 cm and subtending an angle 36° at the centre of the circle is ..... cm.

(*a*) 3π

(*b*) 5π

(*c*) 15π

(*d*) 30π

(*ii*) The diameter of a circle whose circumference is 14π cm is ..... cm.

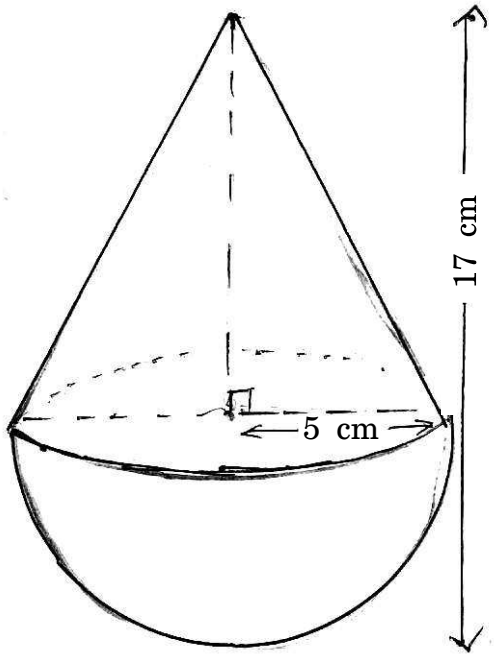
(*a*) 7

(*b*) 14

(*c*) 21

(*d*) 28

(B) A toy is in the form of a hemisphere surmounted by a conical top of the same base radius as shown in the figure. If the radius of the base of conical top is 5 cm and height of the toy is 17 cm,



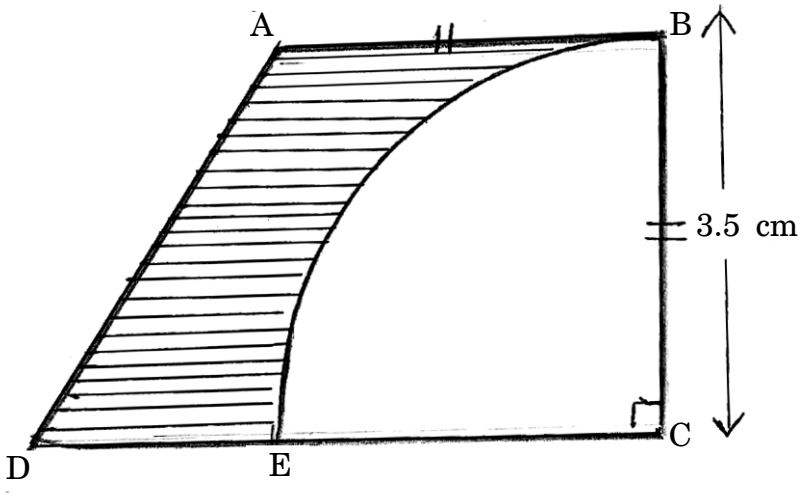
find : 2

(*i*) The slant height of the cone.

(*ii*) The curved surface area of the hemisphere.

(Do not substitute for π)

(C) In the adjoining figure a piece of cardboard is in the shape of trapezium ABCD where AB || DC and $\angle BCD = 90^{\circ}$. A quadrant with centre C and radius 3.5 cm is drawn. If AB = BC and DE = 2 cm, then find the area of the shaded region. $\left(\pi = \frac{22}{7}\right)$ 3



(D) The surface area of a solid metallic sphere is 616 cm^2. The sphere is melted and recast into smaller cones, each of diameter 3.5 cm and height 14 cm respectively. Find the number of such cones formed. $\left(\pi = \frac{22}{7}\right)$

3