SEMESTER 2 EXAMINATION

MATHEMATICS

Maximum Marks: 40

Time Allowed: One and a half hours

Answers to this Paper must be written on the paper provided separately.

You will not be allowed to write during the first 10 minutes.

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers.

*Attempt **all** questions from **Section A** and **any three** questions from **Section B**.*

The marks intended for questions are given in brackets [ ].

Mathematical tables are provided.

SECTION A

*(Attempt **all** questions.)*

Question 1

Choose the correct answers to the questions from the given options. (Do not copy the question. Write the correct answer only.) [10]

(i) The probability of getting a number divisible by 3 in throwing a dice is:

(a) $\frac{1}{6}$

(b) $\frac{1}{3}$

(c) $\frac{1}{2}$

(d) $\frac{2}{3}$

(ii) The volume of a conical tent is 462 m^3 and the area of the base is 154 m^2. The height of the cone is:

(a) 15 m

(b) 12 m

(c) 9 m

(d) 24 m

(iii) The median class for the given distribution is:

Class Interval	0 – 10	10 – 20	20 – 30	30 – 40
Frequency	2	4	3	5

(a) 0 – 10

(b) 10 – 20

(c) 20 – 30

(d) 30 – 40

(iv) If two lines are perpendicular to one another then the relation between their slopes m_1 and m_2 is:

(a) $m_1 = m_2$

(b) $m_1 = \frac{1}{m_2}$

(c) $m_1 = -m_2$

(d) $m_1 \times m_2 = -1$

(v) A lighthouse is 80 m high. The angle of elevation of its top from a point 80 m away from its foot along the same horizontal line is:

(a) 60°

(b) 45°

(c) 30°

(d) 90°

(vi) The modal class of a given distribution always corresponds to the:

(a) interval with highest frequency

(b) interval with lowest frequency

(c) the first interval

(d) the last interval

(vii) The coordinates of the point P(-3,5) on reflecting on the x axis are:

(a) (3,5)

(b) (-3,-5)

(c) (3,-5)

(d) (-3,5)

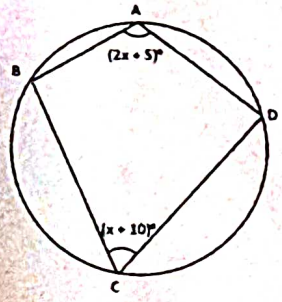
(viii) ABCD is a cyclic quadrilateral. If $\angle BAD = (2x+5)°$ and $\angle BCD = (x + 10)°$ then x is equal to:

(a) 65°

(b) 45°

(c) 55°

(d) 5°



(ix) A (1,4) , B (4,1) and C (x,4) are the vertices of ΔABC. If the centroid of the triangle is G (4,3) then x is equal to:

(a) 2

(b) 1

(c) 7

(d) 4

(x) The radius of a roller 100 cm long is 14 cm. The curved surface area of the roller is: (Take $\pi = \frac{22}{7}$)

(a) 13200 cm^2

(b) 15400 cm^2

(c) 4400 cm^2

(d) 8800 cm^2

SECTION B

(Attempt any three questions from this Section.)

Question 2

(i) Prove that: [2]

$$\frac{1}{1+Sin\,\theta} + \frac{1}{1-Sin\theta} = 2Sec^2\theta$$

(ii) Find 'a', if A (2a+2,3) , B (7,4) and C (2a + 5, 2) are collinear. [2]

(iii) Calculate the mean of the following frequency distribution. [3]

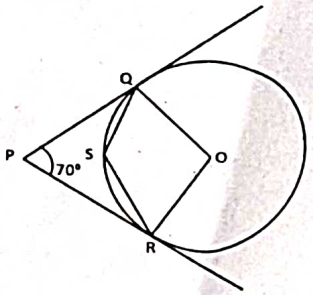
Class Interval	5-15	15-25	25-35	35-45	45-55
Frequency	2	6	4	8	4

(iv) In the given figure O is the centre of the circle. PQ and PR are tangents and $\angle QPR = 70^{\circ}$. [3]

Calculate:

(a) $\angle QOR$

(b) $\angle QSR$

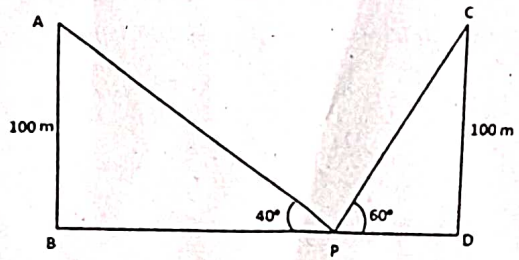


Question 3

(i) A bag contains 5 white, 2 red and 3 black balls. A ball is drawn at random. What is the probability that the ball drawn is a red ball? [2]

(ii) A solid cone of radius 5 cm and height 9 cm is melted and made into small cylinders of radius of 0.5 cm and height 1.5 cm. Find the number of cylinders so formed. [2]

(iii) Two lamp posts AB and CD each of height 100 m are on either side of the road. P is a point on the road between the two lamp posts. The angles of elevation of the top of the lamp posts from the point P are 60° and 40°. Find the distances PB and PD. [3]



(iv) Marks obtained by 100 students in an examination are given below. [3]

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of students	5	15	20	28	20	12

Draw a histogram for the given data using a graph paper and find the mode.

Take 2 cm = 10 marks along one axis and 2 cm = 10 students along the other axis.

Question 4

(i) Find a point P which divides internally the line segment joining the points A (-3, 9) and B (1, -3) in the ratio 1:3. [2]

(ii) A letter of the word 'SECONDARY' is selected at random. What is the probability that the letter selected is not a vowel? [2]

(iii) Use a graph paper for this question. Take 2cm = 1 unit along both the axes. [3]

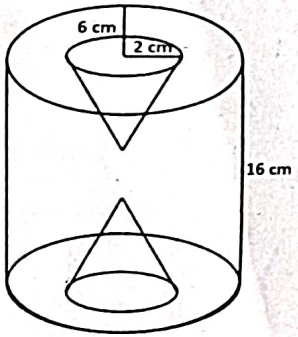
(a) Plot the points A(0,4), B(2,2), C(5,2) and D(4,0). E (0,0) is the origin.

(b) Reflect B, C, D on the y-axis and name them as B', C' and D' respectively.

(c) Join the points ABCDD'C'B' and A in order and give a geometrical name to the closed figure.

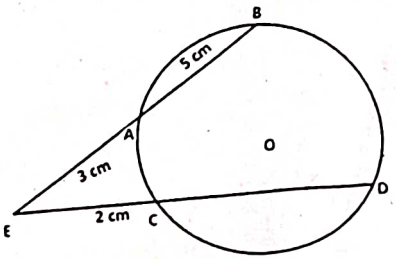
(iv) A solid wooden cylinder is of radius 6 cm and height 16 cm. Two cones each of radius 2 cm and height 6 cm are drilled out of the cylinder. Find the volume of the remaining solid. [3]

Take $\pi = \frac{22}{7}$

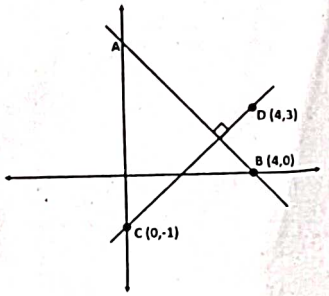


Question 5

(i) Two chords AB and CD of a circle intersect externally at E. If EC = 2 cm, EA = 3 cm and AB = 5 cm, find the length of CD. [2]



(ii) Line AB is perpendicular to CD. Coordinates of B, C and D are respectively (4,0), (0,–1) and (4,3).



Find: [2]

(a) Slope of CD

(b) Equation of AB

(iii) Prove that: [3]

$$\frac{(1+\sin\theta)^2+(1-\sin\theta)^2}{2\cos^2\theta} = \sec^2\theta + \tan^2\theta$$

(iv) The mean of the following distribution is 50. Find the unknown frequency. [3]

Class Interval	Frequency
0 – 20	6
20 – 40	f
40 – 60	8
60 – 80	12
80 – 100	8

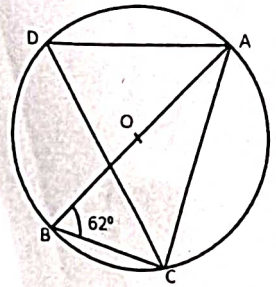
Question 6

(i) Prove that: [2]

$$1+\frac{\tan^2\theta}{1+\sec\theta} = \sec\theta$$

(ii) In the given figure A, B, C and D are points on the circle with centre O. Given $\angle ABC = 62^0$.

Find: [2]



(a) $\angle ADC$

(b) $\angle CAB$

(iii) Find the equation of a line parallel to the line $2x + y - 7 = 0$ and passing through the intersection of the lines $x + y - 4 = 0$ and $2x - y = 8$. [3]

(iv) Marks obtained by 40 students in an examination are given below.

Marks	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
No. of Students	3	8	14	9	4	2

Using graph paper draw an ogive and estimate the median marks. Take 2 cm = 10 marks along one axis and 2 cm = 5 students along the other axis. [3]