S.S.C. PUBLIC EXAMINATIONS, MARCH-2019

MATHEMATICS

PAPER - II

PRINCIPLES OF VALUATION

General Instructions :

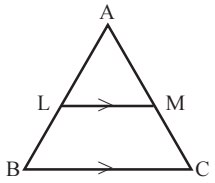
1. *Any logical method is valid.*
2. *If a candidate exceeds choice all answers have to be valued. The answer securing highest marks should be taken into account and the others should be marked as "Excess".*
3. *Wrong answer should be struck off and "0" (Zero) marks should be awarded.*
4. *Marks should be awarded according to the logical sequential steps.*
5. *Final answer is not the criteria for awarding marks.*
6. *Page wise marks should be noted in brackets otherwise write nil.*
7. *While entering the total marks fraction should be rounded off to the next integer.*

SECTION - I

1. $\frac{AL}{LB} = \frac{AM}{MC}$

$\frac{2}{3} = \frac{5}{MC}$

} **$^1/_2$ M**



$MC = \frac{15}{2} = 7.5$ cm

$AC = AM + MC = 5 + 7.5 = 12.5$ cm

} **$^1/_2$ M**

1 M

2. $\sin 15° \cdot \sec 75°$

$= \sin 15° \cdot \sec (90 - 15)°$ **$^1/_2$ M**

$= \sin 15° \cdot \operatorname{cosec} 15°$

$= \sin 15° \cdot \frac{1}{\sin 15°}$ } **$^1/_2$ M**

$= 1$

1 M

3. Total Number of balls = 3 + 4 = 7

Total Number of possible outcomes = 7

Favourable outcomes that the ball be a red ball = 4

$^1/_2$ M

Probability for the ball drawn to be the red = $\frac{4}{7}$

$^1/_2$ M

1 M

4. $\bar{x} = a + \frac{\Sigma f_i d_i}{\Sigma f_i}$

f_i = Frequency of the class **$^1/_2$ M**

d_i = deviation = $x_i - a$ **$^1/_2$ M**

1 M

SECTION - II

5. Distance between two points = $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ **$^1/_2$ M**

Distance between (x, 1), (–1, 5) = 5

$\sqrt{[x-(-1)]^2 + (1-5)^2}$ = 5 **$^1/_2$ M**

$\sqrt{(x+1)^2 + (-4)^2}$ = 5

$x^2 + 1 + 2x + 16$ = 25

$x^2 + 2x - 8$ = 0 **$^1/_2$ M**

$(x + 4)(x - 2)$ = 0

x = –4 or x = 2 **$^1/_2$ M**

2 M

6. Radius of the circle (r) = 5 cm

Distance between the centre and the external point (d) = 13 cm

Length of the tangent = $\sqrt{d^2 - r^2}$ **$^1/_2$ M**

= $\sqrt{13^2 - 5^2}$ **$^1/_2$ M**

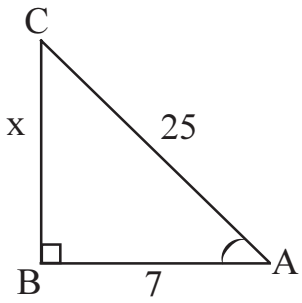
= $\sqrt{169 - 25}$

= $\sqrt{144}$ **1 M**

= 12 cm

2 M

7. In right angled triangle ΔABC



$\cos A = \frac{7}{25} = \frac{AB}{AC}$ **$^1/_2$ M**

$x^2 + 7^2 = 25^2$

$x^2 = 25^2 - 7^2 = 576$

$x = 24$

$\sin A = \frac{24}{25}$ **$^1/_2$ M**

$\text{cosec } A = \frac{25}{24}$ **$^1/_2$ M**

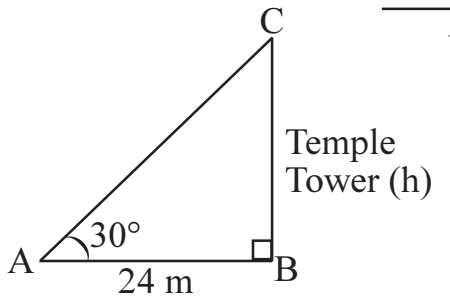
Observed that $\text{cosec } A = \frac{1}{\sin A}$ **$^1/_2$ M**

2 M

8. Distance between the observer and the foot of the Tower = 24 m

Height of the temple Tower = h m

$\theta = 30°$



$^1/_2$ M

From ΔABC, $\tan 30° = \frac{BC}{AB}$ **$^1/_2$ M**

$\frac{1}{\sqrt{3}} = \frac{h}{24}$ **$^1/_2$ M**

$\sqrt{3}h = 24$

$h = \frac{24}{\sqrt{3}} = 8\sqrt{3}\text{m}$ **$^1/_2$ M**

Height of the Tower = $8\sqrt{3}$ m

2 M

9.

Class interval	frequency	mid value of the class
8-11	4	9.5
12-15	4	13.5
16-19	5	17.5
20-23	13	21.5
24-27	20	25.5
28-31	14	29.5
32-35	8	33.5

2 M

2 M

SECTION - III

10 a) $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2$

$= \sin^2 A + 2 \sin A \operatorname{cosec} A + \operatorname{cosec}^2 A + \cos^2 A + 2 \cos A \sec A + \sec^2 A$ **1 M**

$= (\sin^2 A + \cos^2 A) + 2(1) + \operatorname{cosec}^2 A + 2(1) + \sec^2 A$ **1 M**

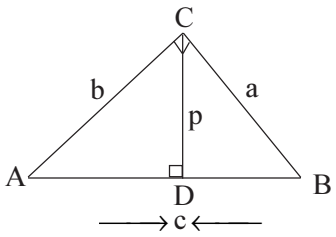
$= 1 + 2 + 1 + \cot^2 A + 2 + 1 + \tan^2 A$ **1 M**

$= 7 + \cot^2 A + \tan^2 A$ **1 M**

4 M

(OR)

10 b) $CD \perp AB$ and $CD = p$



Area of $\Delta ABC = \frac{1}{2} \cdot AB \cdot CD$

$= \frac{1}{2}cp$ —— (1) **$^1/_2$ M**

Area of $\Delta ABC = \frac{1}{2} \cdot BC \cdot AC$

$= \frac{1}{2}ab$ —— (2) **$^1/_2$ M**

From (1) and (2) equations

$\frac{1}{2}cp = \frac{1}{2}ab$

$cp = ab$ **1 M**

$c = \frac{ab}{p}$

In ΔABC right angle is at C.

$AB^2 = BC^2 + AC^2$

$c^2 = a^2 + b^2$

$\left(\frac{ab}{p}\right)^2 = a^2 + b^2$ **1 M**

$\frac{a^2b^2}{p^2} = a^2 + b^2$

$\frac{1}{P^2} = \frac{a^2 + b^2}{a^2b^2}$

$\frac{1}{p^2} = \frac{a^2}{a^2b^2} + \frac{b^2}{a^2b^2}$ **1 M**

$\frac{1}{p^2} = \frac{1}{b^2} + \frac{1}{a^2}$

4 M

11a)

Class Interval	frequency	cumulative frequency
CI	**f**	**cf**
11-15	3	3
16-20	5	8
21-25	9	17 cf
l 26-30	12 f	29
31-35	7	36
36-40	4	40

1 M

$n = 40, \quad \frac{n}{2} = \frac{40}{2} = 20$

$l = 25.5, \quad f = 12, \quad cf = 17, \quad h = 5$ **1 M**

Median $= l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$ **$^1/_2$ M**

$= 25.5 + \left(\frac{20-17}{12}\right) \times 5$ **$^1/_2$ M**

$= 25.5 + \left(\frac{3}{12} \times 5\right)$

$= 25.50 + \frac{5}{4}$ **$^1/_2$ M**

$= 25.50 + 1.25$

$= 26.75$ **$^1/_2$ M**

4 M

(OR)

11 b) Let (–4, 6) divides the line segment joining points A(–6, 10) and B(3, –8) in the ratio $m_1 : m_2$

$(x, y) = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$ **1 M**

$(-4, 6) = \left(\frac{3m_1 - 6m_2}{m_1 + m_2}, \frac{-8m_1 + 10m_2}{m_1 + m_2}\right)$ **1 M**

$-4 = \frac{3m_1 - 6m_2}{m_1 + m_2}$ and $6 = \frac{-8m_1 + 10m_2}{m_1 + m_2}$ **$^1/_2$ M**

$-4 = \frac{3m_1 - 6m_2}{m_1 + m_2}$

$-4m_1 - 4m_2 = 3m_1 - 6m_2$ **$^1/_2$ M**

$-4m_1 - 3m_1 = -6m_2 + 4m_2$

$-7m_1 = -2m_2$

$\frac{m_1}{m_2} = \frac{-2}{-7} = \frac{2}{7}$

$\therefore m_1 : m_2 = 2 : 7$ **1 M**

$\therefore$ The point (–4, 6) divides the line segment joining the points A(–6, 10) and B(3, –8) in the ratio 2 : 7

4 M

12 a) **Possible outcomes when two dice are thrown simultaneously**

$$S = \begin{pmatrix} (1,1), & (1,2), & (1,3), & (1,4), & (1,5), & (1,6) \\ (2,1), & (2,2), & (2,3), & (2,4), & (2,5), & (2,6) \\ (3,1), & (3,2), & (3,3), & (3,4), & (3,5), & (3,6) \\ (4,1), & (4,2), & (4,3), & (4,4), & (4,5), & (4,6) \\ (5,1), & (5,2), & (5,3), & (5,4), & (5,5), & (5,6) \\ (6,1), & (6,2), & (6,3), & (6,4), & (6,5), & (6,6) \end{pmatrix}$$

Total number of possible outcomes = $6 \times 6 = 36$ **$^1/_2$ M**

Favourable outcomes for the sum is 10 = (4, 6), (5, 5), (6, 4)

a) Number of favourable outcomes for sum 10 = 3

$$P(E) = \frac{\text{Number of favourable outcomes to E}}{\text{Total number of possible outcomes}}$$

$$P(\text{sum } 10) = \frac{3}{36} = \frac{1}{12}$$ **$^1/_2$ M**

b) Number of favourable outcomes of sum $\leq 12 = 36$ **$^1/_2$ M**

$$P(\text{sum} \leq 12) = \frac{36}{36} = 1$$ **$^1/_2$ M**

c) Favourable outcomes for the sum is prime = (1, 1), (1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (4, 1), (4, 3), (5, 2), (5, 6), (6, 1), (6, 5)

Number of favourable outcomes for the sum is prime = 15 **$^1/_2$ M**

$$P(\text{sum prime}) = \frac{15}{36} = \frac{5}{12}$$ **$^1/_2$ M**

d) Favourable outcomes for the sum is a multiple of 3 = (1, 2), (1, 5), (2, 1), (2, 4), (3, 3), (3, 6), (4, 2), (4, 5), (5, 1), (5, 4), (6, 3), (6, 6)

Number of favourable outcomes for the sum is a multiple of 3 = 12 **$^1/_2$ M**

$$P(\text{sum is multiple of } 3) = \frac{12}{36} = \frac{1}{3}$$ **$^1/_2$ M**

Note : No need to mention all the possible outcomes and favourable outcomes, it is enough to mention the number.

4 M

(OR)

12 b) Let the Height of the tree before fall be AB = (x + y) m

BD = 6 m

Tree is broken at C.

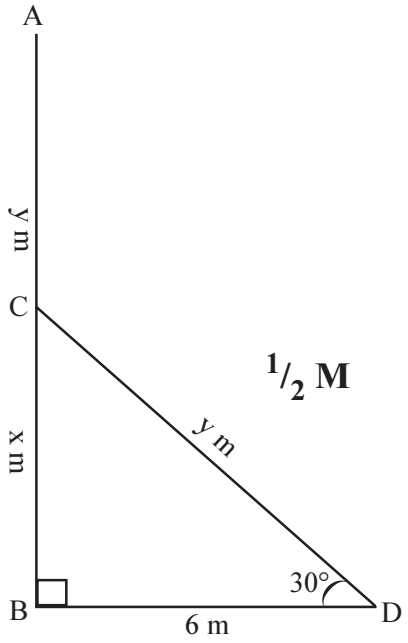
Its top A touches the ground at D

AC = CD = y m.

Angle of elevation $\angle BDC = 30°$

BC = x m.

$^1/_2$ M



$^1/_2$ M

In right triangle ΔCBD

$$\tan 30° = \frac{BC}{BD}$$

$$\frac{1}{\sqrt{3}} = \frac{x}{6}$$

$$\sqrt{3}x = 6$$

$$x = \frac{6}{\sqrt{3}} \text{ m} = 2\sqrt{3} \text{ m}$$

1 M

$$\cos 30° = \frac{BD}{CD}$$

$$\frac{\sqrt{3}}{2} = \frac{6}{y}$$

$$\sqrt{3}\,y = 12$$

$$y = \frac{12}{\sqrt{3}} = 4\sqrt{3} \text{ m.}$$

1 M

Height of the tree before falling down

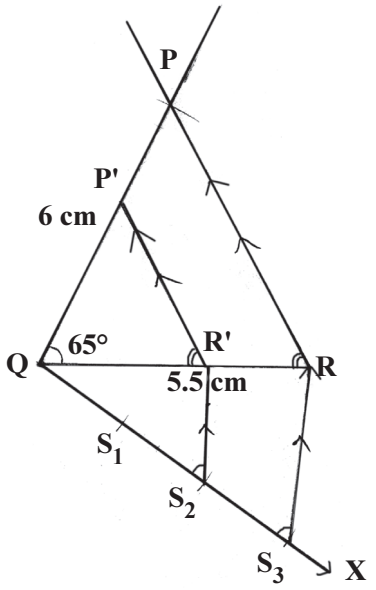
$$= 2\sqrt{3} + 4\sqrt{3}$$

$$= 6\sqrt{3} \text{ m.}$$

1 M

4 M

13 a)



For the construction of figure award marks as follows :

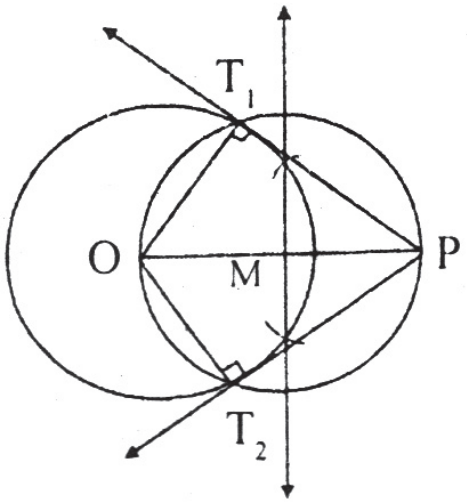
1. To construct ΔPQR with measurements QR = 5.5 cm, ∠Q = 65°, PQ = 6 cm. **1 M**
2. To draw a ray with an acute angle ∠RQX at Q. **$^1/_2$ M**
3. To locate S_1, S_2, S_3 on $\overrightarrow{QX}$ such that $QS_1 = S_1S_2 = S_2S_3$ **$^1/_2$ M**
4. To join S_3R **$^1/_2$ M**
5. To draw S_2R' parallel to S_3R and P'R' parallel to PR **$^1/_2$ M**

   ΔPQR ~ ΔP'QR'
6. For writing construction procedure. **1 M**

4 M

(OR)

13 b)



I. Award marks for construction as follows :

i) To draw a circle with radius 4 cm with centre O **1 M**

ii) To plot a point P such that OP = 6 cm. **$^1/_2$ M**

iii) To Bisect OP at M and draw circle with radius OM or MP **1 M**

iv) To draw tangents from intersecting points of two circles. **$^1/_2$ M**

II. For writing construction procedure **1 M**

4 M

PART - B

$20 \times {}^{1}/_{2}$ M = 10 M

SECTION - IV

14.	A	24.	C
15.	B	25.	B
16.	B	26.	C
17.	C	27.	B
18.	D	28.	B
19.	B	29.	A
20.	B	30.	C
21.	A	31.	B
22.	C	32.	C
23.	B	33.	C