

MODEL ANSWER KEY SLB: Mathematics (E)
SEMESTER - I OCT'25 Grade: 9, MM=80

MT = 3 HRS.

NOTE: Any other alternative method unless specified otherwise should give full credit.

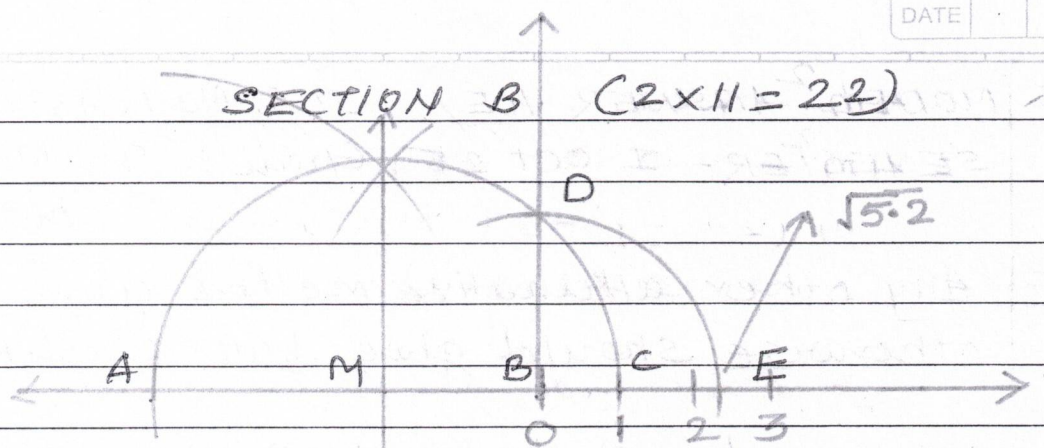
Total number of pages : 12.

SECTION A (1X20=20)

Q. NO 1 to 20, 1 mark each for every correct response.

- 1 Non-terminating and non-recurring.
- 2 $\sqrt{441}$
- 3 3
- 4 $5x^2 + 6x + \sqrt{10}$
- 5 1
- 6 180°
- 7 150°
- 8 110°
- 9 Square
- 10 0
- 11 $12/7$
- 12 1.54
- 13 756
- 14 $40^\circ; 140^\circ$
- 15 120°
- 16 270°
- 17 $1 - \sin^2 \theta = \cos^2 \theta$
- 18 $3/\sqrt{7}$
- 19 Assertion (A) is false but Reason (R) is true.
- 20 Both Assertion (A) and Reason (R) are true Reason (R) does not explain Assertion (A).

21.



- To locate a point A such that $AB = 5.2$ units on the number line - $\frac{1}{2}$
- To draw $\perp$ bisector of AC AS
- To draw semicircle with centre M and radius = AM OR CM units } $\frac{1}{2}$
- To draw a line perpendicular to AC passing through B and intersecting the semicircle at D - $\frac{1}{2}$
- To draw an arc with centre B and radius BD intersecting at E on a number line. - $\frac{1}{2}$

22

12

$\therefore x = 0.4545 \dots$

$$\therefore 100\% = 100 \times 0.4545 \dots$$

$$100x = 45.4545 \dots$$

$$\textcircled{2} \quad u = 0.4545 \dots$$

$$99u = 45$$

$$\frac{n}{99} = \frac{45}{99}$$

$$n = \frac{9 \times 5}{9 \times 11}$$

$$x = \frac{5}{11}$$

2



$$\begin{aligned}
 23 \quad & 4m^2 - 20m + 9 \\
 &= 4m^2 - 18m - 2m + 9 \quad -1 \\
 &= 2m(2m-9) - 1(2m-9) \quad -\frac{1}{2} \\
 &= (2m-9)(2m-1) \quad -\frac{1}{2} \\
 &\quad \boxed{2}
 \end{aligned}$$

OR

$$\begin{aligned}
 & 5x^2 - 13x - 6 \\
 &= 5x^2 - 15x + 2x - 6 \quad -1 \\
 &= 5x(x-3) + 2(x-3) \quad -\frac{1}{2} \\
 &= (x-3)(5x+2) \quad -\frac{1}{2} \\
 &\quad \boxed{2}
 \end{aligned}$$

$$24 \quad \therefore 2^m = \frac{2^5 + 2^5}{2^2}$$

$$= \frac{2^1 2^5}{2^2} \quad -\frac{1}{2}$$

$$= 2^{1+5-2} \quad -\frac{1}{2}$$

$$2^m = 2^4 \quad -\frac{1}{2}$$

$$\therefore m = 4 \quad -\frac{1}{2} \quad \boxed{2}$$

$$\begin{aligned}
 25 \quad & (3a-5b)^3 \\
 &= (3a)^3 - 3(3a)^2(5b) + 3(3a)(5b)^2 - (5b)^3 \quad -\frac{1}{2} \\
 &= 27a^3 - 3(9a^2)(5b) + 3(3a)(25b^2) - 125b^3 - 1 \\
 &= 27a^3 - 135a^2b + 225ab^2 - 125b^3 \quad -\frac{1}{2}
 \end{aligned}$$

OR

$$\begin{aligned}
 & 98 \times 103 \\
 &= (100-2)(100+3) \quad -\frac{1}{2} \\
 &= (100)^2 + (-2+3)(100) + (-2)(3) \quad -\frac{1}{2} \\
 &= 10000 + 1(100) - 6 \quad -\frac{1}{2} \\
 &= 10,094 \quad -\frac{1}{2}
 \end{aligned}$$

 $\boxed{2}$ p10

26

Given

$$p(x) = x^2 - 5kx + 6$$

$$\therefore p(1) = p(2)$$

$$\therefore 1^2 - 5k(1) + 6 = (2)^2 - 5k(2) + 6 \rightarrow \frac{1}{2} + \frac{1}{2}$$

$$\therefore 1 - 5k + 6 = 4 - 10k + 6$$

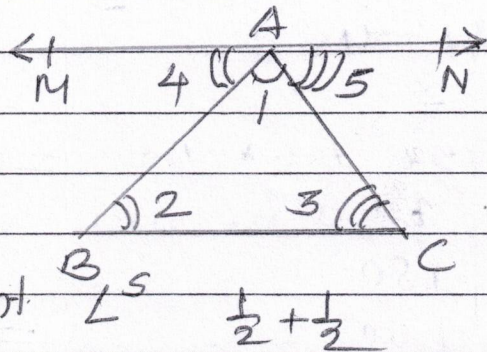
$$-5k + 10k = 4 - 1 \rightarrow \frac{1}{2}$$

$$5k = 3$$

$$k = \frac{3}{5} \rightarrow \frac{1}{2}$$

[2]

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 $\therefore MN \parallel BC$


$$\therefore i) \angle 2 = \angle 4$$

$$ii) \angle 3 = \angle 5$$

} alt. int.

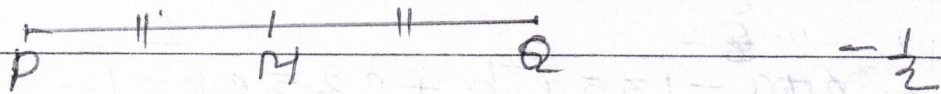
$$\frac{1}{2} + \frac{1}{2}$$

$$\text{But iii) } \angle 1 + \angle 4 + \angle 5 = 180^\circ \text{ LPA} \rightarrow \frac{1}{2}$$

$$iv) \angle 1 + \angle 2 + \angle 3 = 180^\circ \text{ using i) \& ii) } \frac{1}{2}$$

[2]

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$$PM = QM \text{ Given}$$

$$PM + PM = PM + QM \text{ (adding PM on both sides)} \rightarrow \frac{1}{2}$$

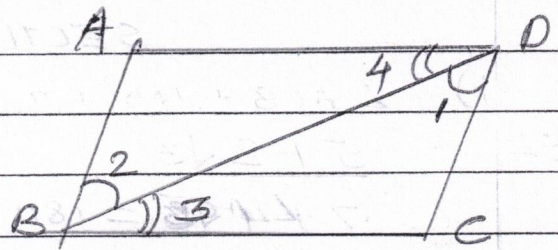
$$2PM = PQ \therefore PM + QM \text{ coincides } PQ \rightarrow \frac{1}{2}$$

$$\therefore PM = \frac{1}{2} PQ$$

$$\frac{1}{2}$$

[2]

29

In $\triangle BCD$ & $\triangle DAB$

$$\angle 1 = \angle 2 \quad \text{alt. int } \angle^s \quad AB \parallel CD \quad -\frac{1}{2}$$

$$\angle 3 = \angle 4 \quad \text{alt. int } \angle^s \quad BC \parallel DA \quad -\frac{1}{2}$$

$$BD = DB \quad \text{Common sides} \quad -\frac{1}{2}$$

$$\triangle BCD \cong \triangle DAB \quad \text{ASA Cong Rule} \quad -\frac{1}{2}$$

[2]

30

$$5 \sin^2 60^\circ + \frac{3}{4} \tan^2 30^\circ$$

$$= 5 \left(\frac{\sqrt{3}}{2} \right)^2 + \frac{3}{4} \left(\frac{1}{\sqrt{3}} \right)^2 \rightarrow \frac{1}{2} + \frac{1}{2}$$

$$= 5 \cdot \frac{3}{4} + \frac{3}{4} \cdot \frac{1}{3}$$

$$= \frac{15}{4} + \frac{1}{4} \quad -\frac{1}{2}$$

$$= \frac{16}{4}$$

$$= 4 \quad -\frac{1}{2}$$

[2]

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$$x + 50 = 180 \quad \text{LPA} \quad -\frac{1}{2}$$

$$\therefore x = 130 \quad -\frac{1}{2}$$

$$y = 120^\circ \quad \text{VOA} \quad -\frac{1}{2}$$

$\therefore$ alternate interior angles are not equal

$\therefore$ lines m and n are not parallel $-\frac{1}{2}$

[2]

SECTION C - (3 x 10 = 30)

32

$$\frac{5+2\sqrt{3}}{7+4\sqrt{3}}$$

$$\frac{5+2\sqrt{3}}{7+4\sqrt{3}}$$

$$= \frac{5+2\sqrt{3}}{7+4\sqrt{3}} \times \frac{7-4\sqrt{3}}{7-4\sqrt{3}} = \frac{1}{2}$$

$$= \frac{(5+2\sqrt{3})(7-4\sqrt{3})}{(7+4\sqrt{3})(7-4\sqrt{3})}$$

$$= \frac{5(7-4\sqrt{3}) + 2\sqrt{3}(7-4\sqrt{3})}{49-16(3)} = \frac{1}{2}$$

$$= \frac{35 - 20\sqrt{3} + 14\sqrt{3} - 24}{49-48} = \frac{1}{2}$$

$$= \frac{11-6\sqrt{3}}{1}$$

$$= \frac{11-6\sqrt{3}}{1} = \frac{1}{2}$$

But $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = a-b\sqrt{3}$ given

And $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = 11-6\sqrt{3}$ after rationalising

$\therefore a=11$ and $b=6$ Comparing above
 $\frac{1}{2} + \frac{1}{2}$

3

33

$$\begin{array}{r}
 x^2 - 5 \\
 x+2 \overline{) x^3 + 2x^2 - 5x + 8} \\
 \underline{x^2 + 2x^2} \\
 \oplus \quad \ominus \\
 -5x + 8 \\
 \underline{-5x - 10} \\
 \oplus \quad \oplus \\
 18
 \end{array}$$

$$\therefore \text{quotient} = x^2 - 5 \quad -\frac{1}{2}$$

$$\text{remainder} = 18 \quad -\frac{1}{2}$$

$$\text{Dividend} = \text{divisor} \times \text{quotient} + \text{remainder}$$

$$\therefore x^3 + 2x^2 - 5x + 8 = (x+2)(x^2 - 5) + 18 \quad -\frac{1}{2}$$

[3]

34.

$$i) \angle BCD = \angle FEC \quad \text{Corresp. } \angle^s, EF \parallel AD \quad -\frac{1}{2}$$

$$\therefore \angle BCD = 85^\circ \quad -\frac{1}{2}$$

$$ii) \angle BAC + 50^\circ = \angle BCD \quad \text{EASPT} \quad -\frac{1}{2}$$

$$\therefore \angle BAC + 50^\circ = 85^\circ$$

$$\therefore \angle BAC = 35^\circ \quad -\frac{1}{2}$$

$$iii) \angle ECA = \angle BCD \quad \text{VOA} \quad -\frac{1}{2}$$

$$\therefore \angle ECA = 85^\circ \quad -\frac{1}{2}$$

[3]

OR

$$i) \angle ACB + 40^\circ + 90^\circ = 180^\circ \quad \text{ASPT} \quad -\frac{1}{2}$$

$$\therefore \angle ACB = 180 - 130$$

$$\angle ACB = 50^\circ \quad -\frac{1}{2}$$

$$ii) \angle CAD + 105^\circ + 50^\circ = 180^\circ \quad \text{ASPT} \quad -\frac{1}{2}$$

$$\angle CAD = 180 - 155^\circ$$

$$\angle CAD = 25^\circ \quad -\frac{1}{2}$$

$$iii) \angle AOB = \angle CAD + \angle BEA \quad \text{EASPT} \quad -\frac{1}{2}$$

$$= 25 + 90^\circ$$

$$\angle AOB = 115^\circ \quad -\frac{1}{2}$$

335 In $\triangle EDM$ & $\triangle FDM$

$$i) DE = DF \quad \text{Given} \quad -\frac{1}{2}$$

$$ii) \angle EDM = \angle FDM \quad DM \text{ bisects } \angle D \quad -\frac{1}{2}$$

$$iii) DM = DM \quad \text{Common side} \quad -\frac{1}{2}$$

$$iv) \triangle EDM \cong \triangle FDM \quad \text{SAS Rule} \quad -\frac{1}{2}$$

$$v) \angle DEM = \angle DFM \quad \text{CPCT} \quad -\frac{1}{2}$$

$$\text{ie } vi) \angle E = \angle F$$

336 In $\triangle ABC$ & $\triangle BAD$

$$i) AC = BD \quad \left. \begin{array}{l} \text{Given} \end{array} \right\} \quad -\frac{1}{2}$$

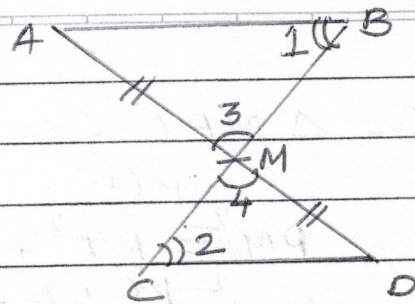
$$ii) \angle CAB = \angle DBA \quad \left. \begin{array}{l} \text{Given} \end{array} \right\} \quad -\frac{1}{2}$$

$$iii) AB = BA \quad \text{Common side} \quad -1$$

$$iv) \triangle ABC \cong \triangle BAD \quad \text{SAS Rule} \quad -1$$

3

OR

In $\triangle ABM$ & $\triangle DCM$

- i) $AM = DM$ $\because M$ is mid-pt of AD — $\frac{1}{2}$
- ii) $\angle 1 = \angle 2$ alt. int $\angle$ s $AB \parallel CD$ — $\frac{1}{2}$
- iii) $\angle 3 = \angle 4$ v.o.a — $\frac{1}{2}$
- iv) $\triangle ABM \cong \triangle DCM$ AAS Cong. Rule — 1
- v) $AB = DC$ CPCT — $\frac{1}{2}$

3

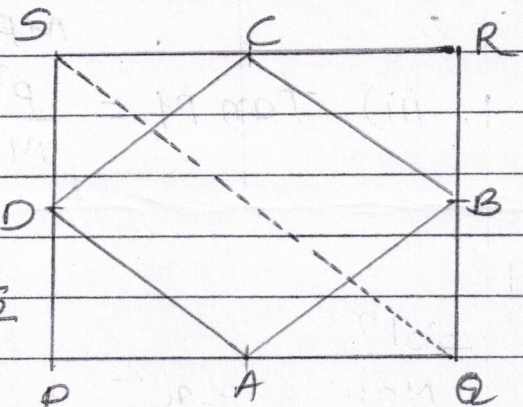
37.

i)

In $\triangle PQS$

A and D are the mid-points of PQ and PS respectively

$\therefore$ by mid-point theorem P



$AD \parallel SQ$ and $AD = \frac{1}{2} SQ$ — * — $\frac{1}{2}$

ii) $\sim$ In $\triangle RSQ$

B and C are the mid-points of RQ and RS respectively

$\therefore BC \parallel SQ$ and $BC = \frac{1}{2} SQ$ — ** — $\frac{1}{2}$

$\therefore BC = AD$ from * & * — $\frac{1}{2}$

iii) Now In $\square ABCD$

$AD = BC$ and $AD \parallel BC$ from i) and ii)

$\therefore \square ABCD$ is a parallelogram

(as quadrilateral is a $\parallel^m$ if any one pair of opposite sides is equal and parallel)

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3

38 In $\triangle MPT$, $\angle T = 90^\circ$ using Pythagoras thm

$$PM^2 = PT^2 + TM^2$$

$$\therefore (25)^2 = PT^2 + (7)^2$$

$$\therefore 625 = PT^2 + 49$$

$$\therefore PT^2 = 625 - 49$$

$$= 576$$

$$\therefore PT = \pm \sqrt{576}$$

$$\therefore PT = \pm 24$$

$\therefore$ i) $PT = 24$ (-24 discarded - $\frac{1}{2}$
as length of side
can't be -ve)

$$\text{ii) } \cos P = \frac{PT}{MP} = \frac{24}{25} \quad - \quad 1$$

$$\text{iii) } \tan M = \frac{PT}{MT} = \frac{24}{7} \quad \rightarrow \quad 1$$

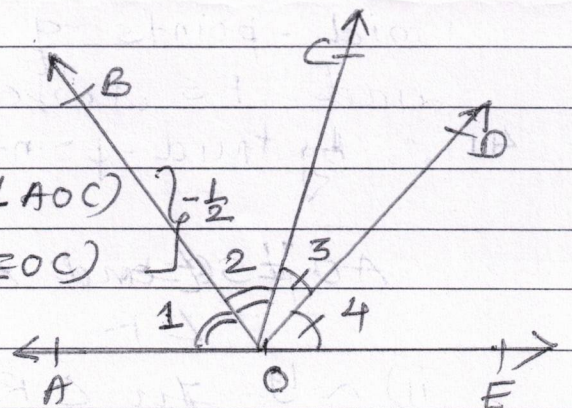
[3]

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Solⁿ

$$\text{i) } \angle 1 = \angle 2 \quad (\text{OB bisects } \angle AOC) \quad - \frac{1}{2}$$

$$\text{ii) } \angle 3 = \angle 4 \quad (\text{OD bisects } \angle EOC) \quad - \frac{1}{2}$$



$$\text{iii) } \angle 1 + \angle 2 + \angle 3 + \angle 4 = 180 \quad (\text{LPA}) \quad - \frac{1}{2}$$

$$\text{iv) } \angle 2 + \angle 2 + \angle 3 + \angle 3 = 180 \quad \text{from i \& ii) } - \frac{1}{2}$$

$$\text{v) } 2\angle 2 + 2\angle 3 = 180 \quad - \frac{1}{2}$$

$$\text{vi) } 2(\angle 2 + \angle 3) = 180 \quad - \frac{1}{2}$$

$$\text{vii) } \angle BOD = \frac{180}{2} = 90^\circ$$

$$\text{viii) } \angle BOD = 90^\circ \quad - \frac{1}{2}$$

[3]

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∴ In $\triangle PQR$

$PQ = QR$

Given

∴

$\angle P = \angle R$

angles opp. to equal sides — $\frac{1}{2}$

Now $PQ = PR$

∴ $2AP = 2BR$

∴ A and B are the mid points of PQ & QR — $\frac{1}{2}$

ii) ∴ $AP = BR$

iii) Also $PC = RC$

C is the mid-pt of PR — $\frac{1}{2}$ Now In $\triangle APC$ & $\triangle BRC$

$\angle P = \angle R$ from i)

$AP = BR$ from ii)

$PC = RC$ from iii)

∴ $\triangle APC \cong \triangle BRC$ SAS Congruent Rule — $\frac{1}{2}$

∴ $AC = BC$ CPCT — $\frac{1}{2}$

[3]

41

Let $\angle Q : \angle R : \angle S = 2 : 3 : 7 = k$ (say)

∴ $\angle Q = 2k$

$\angle R = 3k$

$\angle S = 7k$

} $\frac{1}{2}$

But $\angle P + \angle Q + \angle R + \angle S = 360$
(Angles sum prop. of a quadrilateral)

∴ $60 + 2k + 3k + 7k = 360$ — $\frac{1}{2}$

$12k = 300$

∴ $k = \frac{300}{12}$

$k = 25$

∴ $\angle Q = 2k = 2(25) = 50^\circ$

$\angle R = 3k = 3(25) = 75^\circ$

$\angle S = 7k = 7(25) = 175^\circ$

} $1\frac{1}{2}$ [3]

SECTION D ($4 \times 2 = 8$)

42.

$$\text{Let } p(x) = 2x^3 + 3x^2 - 5x - 6$$

$$\begin{aligned} p(-1) &= 2(-1)^3 + 3(-1)^2 - 5(-1) - 6 \\ &= 2(-1) + 3(1) + 5 - 6 \\ &= -2 + 3 + 5 - 6 \\ &= 1 - 1 \end{aligned}$$

$$p(-1) = 0$$

$\therefore x+1$ is a factor of the given poly. $-\frac{1}{2}$

$$\begin{array}{r|l} 2x^2 + x - 6 & \frac{1}{2} \\ x+1 & 2x^3 + 3x^2 - 5x - 6 \\ & \underline{2x^3 + 2x^2} \\ & \ominus \quad \ominus \\ & x^2 - 5x - 6 \\ & \underline{\ominus x^2 + x} \\ & \ominus \quad \ominus \\ & -6x - 6 \\ & \underline{-6x - 6} \\ & \oplus \quad \oplus \\ & 0 \end{array} \quad \left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} \frac{1}{2}$$

$$\text{Now } 2x^2 + x - 6$$

$$\begin{aligned} &= 2x^2 + 4x - 3x - 6 \quad \frac{1}{2} \\ &= 2x(x+2) - 3(x+2) \\ &= (x+2)(2x-3) \quad \frac{1}{2} \end{aligned}$$

$$\therefore 2x^3 + 3x^2 - 5x - 6 = (x+1)(x+2)(2x-3) \quad \frac{1}{2}$$

[4]

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i) $\angle 1 = \angle 2$ PN is bisector of $\angle MPR$ $-\frac{1}{2}$

ii) $\angle 1 = \angle 3$ Corresp. $\angle^s$ PN $\parallel$ QR $-\frac{1}{2}$

$\therefore$ iii) $\angle 2 = \angle 3$ from i) and ii) -1

iv) $\angle 2 = \angle 4$ alt. int. $\angle^s$ PN $\parallel$ QR $-\frac{1}{2}$

v) $\angle 3 = \angle 4$ from iii) & iv) -1

$\therefore$ In $\triangle PQR$

PQ = PR sides opp. to equal $\angle^s$ $\frac{1}{2}$

$\therefore \triangle PQR$ is an isosceles $\triangle$