Roll No.												Serial No. of Q. C. A. B.

ಒಟ್ಟು ಪ್ರಶ್ನೆಗಳ ಸಂಖ್ಯೆ : 58] [ಒಟ್ಟು ಮುದ್ರಿತ ಪುಟಗಳ ಸಂಖ್ಯೆ : 40

Total No. of Questions : 58] [Total No. of Printed Pages : 40

ಸಂಕೇತ ಸಂಖ್ಯೆ : 81-E **ವಿಷಯ : ಗಣಿತ**

Code No. : 81-E **Subject : MATHEMATICS**

(ಇಂಗ್ಲೀಷ್ ಭಾಷಾಂತರ / English Version)

ದಿನಾಂಕ : 08. 04. 2013] [Date : 08 04. 2013

ಸಮಯ : ಬೆಳಿಗ್ಗೆ 9-30 ರಿಂದ ಮಧ್ಯಾಹ್ನ 12-45 ರವರೆಗೆ] [Time : 9-30 A.M. to 12-45 P.M.

ಪರಮಾವಧಿ ಅಂಕಗಳು : 100] [Max. Marks : 100

FOR OFFICE USE ONLY

Q. No.	Marks		Q. No.	Marks		Q. No.	Marks		Q. No.	Marks		Q. No.	Marks
1.			14.			27.			40.			53.	
2.			15.			28.			41.			54.	
3.			16.			29.			42.			55.	
4.			17.			30.			43.			56.	
5.			18.			31.			44.			57.	
6.			19.			32.			45.			58.	
7.			20.			33.			46.			×	
8.			21.			34.			47.			×	
9.			22.			35.			48.			×	
10.			23.			36.			49.			×	
11.			24.			37.			50.			×	
12.			25.			38.			51.			×	
13.			26.			39.			52.			×	
												Total Marks	

Total Marks in words		Grand Total	

1. ✓			
2. ✓		✓	✓
Signature of Evaluators	*Registration No.*	*Signature of the Deputy Chief*	*Signature of the Room Invigilator*

General Instructions :

i) The Question-cum-Answer Booklet consists of objective and subjective types of questions having 58 questions.

ii) Space has been provided against each objective type question. You have to choose the correct choice and write the complete answer along with its alphabet in the space provided.

iii) For subjective type questions enough space for each question has been provided. You have to answer the questions in the space.

iv) Follow the instructions given against both the objective and subjective types of questions.

v) Candidate should not write the answer with pencil. Answers written in pencil will not be evaluated. (Except Graphs, Diagrams & Maps)

vi) In case of Multiple Choice, Fill in the blanks and Matching questions, scratching / rewriting / marking is not permitted, thereby rendering to disqualification for evaluation.

vii) Candidates have extra 15 minutes for reading the question paper.

viii) **Space for Rough Work** has been printed and provided at the bottom of each page.

I. *Four* alternatives are given for each of the following questions / incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its alphabet in the space provided against each question. $20 \times 1 = 20$

1. If A, B and C are non-empty sets then the 'Intersection of sets is distributive over union of sets' is represented as

   (A) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

   (B) $A \cap (B \cap C) = (A \cap B) \cap (A \cap C)$

   (C) $(A \cup B) \cup C = (A \cap C) \cup (B \cup C)$

   (D) $(A \cap B) \cup C = (A \cup C) \cap (B \cup C)$

Ans. : _____

(SPACE FOR ROUGH WORK)

2. If 5 and 2 are the Arithmetic Mean and Harmonic Mean of two distinct numbers, then their Geometric Mean is

(A) 3 (B) 7

(C) $\sqrt{10}$ (D) 10.

Ans. : _____

3. If $A + B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ and $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$ then matrix B is

(A) $\begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 4 \\ 1 & 2 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & 4 \\ 1 & 1 \end{bmatrix}$ (D) $\begin{bmatrix} 4 & 2 \\ 1 & 1 \end{bmatrix}$

Ans. : _____

4. If ${}^{n}C_{8} = {}^{n}C_{5}$, then the value of n is

(A) 2 (B) 3

(C) 1 (D) 13.

Ans. : _____

5. The H.C.F. of $5x^2y^3$ and $10x^3y^2$ is

(A) $10x^3y^3$ (B) $5x^2y^2$

(C) $5xy$ (D) $5x^3y^3$.

Ans. : _____

(SPACE FOR ROUGH WORK)

6. The expansion of $\sum_{p,q,r} p^2$ is

(A) $p^2 q^2 r^2$ (B) pqr

(C) p^2 (D) $p^2 + q^2 + r^2$.

Ans. : _____

7. The value of $\sum_{a,b,c} a(b-c)$ is

(A) $2(ab + bc + ca)$ (B) $ab + bc + ca$

(C) 0 (D) $a + b + c$.

Ans. : _____

8. If one factor of $a^3 + b^3$ is $(a + b)$, then the other factor is

(A) $a^3 + b^3 + ab$ (B) $a - b + ab$

(C) $a^2 + b^2 - ab$ (D) $a^2 + b^2 + ab$

Ans. : _____

9. If $x\sqrt{y} = \sqrt{80}$, then the value of y is

(A) 5 (B) 16

(C) 4 (D) 20.

Ans. : _____

(SPACE FOR ROUGH WORK)

10. The simplified form of $10\sqrt[3]{x} - 8\sqrt[3]{x}$ is

(A) $18\sqrt[3]{x}$ (B) $2\sqrt{x}$

(C) $2\sqrt[3]{x}$ (D) $18\sqrt{x}$

Ans. : _____

11. If $4x = \frac{81}{x}$, then the value of x is

(A) $-4{\cdot}5$ (B) $\pm 4{\cdot}5$

(C) $4{\cdot}5$ (D) $\pm 0{\cdot}45$.

Ans. : _____

12. The quadratic equation having the roots $(2+\sqrt{3})$ and $(2-\sqrt{3})$ is

(A) $x^2 - 4x + 1 = 0$ (B) $x^2 + 4x - 1 = 0$

(C) $x^2 - 4x - 1 = 0$ (D) $x^2 + 4x + 1 = 0$

Ans. : _____

13. If $3 \oplus y \equiv 2 \pmod 6$, then the value of y is

(A) 2 (B) 4

(C) 5 (D) 6.

Ans. : _____

14. Out of the following sets, Z_4 is

(A) $\{0, 1, 2\}$ (B) $\{0, 1, 2, 3\}$

(C) $\{0, 1, 2, 3, 4\}$ (D) $\{1, 2, 3, 4\}$

Ans. : _____

(SPACE FOR ROUGH WORK)

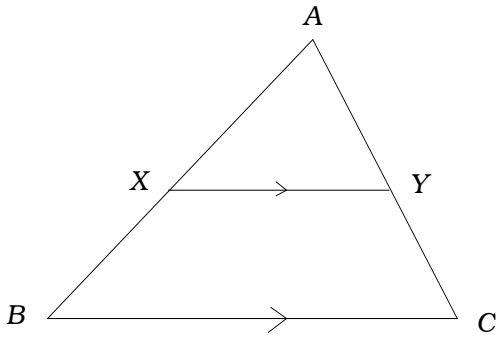
15. In ΔABC, D and E are the mid-points of AB and AC respectively, then the area of ΔADE is

(A) $4\ \Delta ABC$ (B) $\frac{1}{4}\ \Delta ABC$

(C) $2\ \Delta ABC$ (D) $\frac{1}{2}\ \Delta ABC$.

Ans. : _____

16. In the given figure, $XY \parallel BC$, then $\frac{AX}{BX}$ =



(A) $\frac{AY}{AC}$ (B) $\frac{YC}{AY}$

(C) $\frac{AX}{AB}$ (D) $\frac{AY}{CY}$.

Ans. : _____

17. In ΔABC, $\angle ABC = 90°$. If $AC = (x + y)$ and $BC = (x - y)$, then the length of AB is

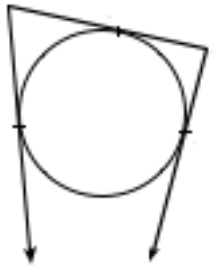
(A) $x^2 - y^2$ (B) $2xy$

(C) $2\sqrt{xy}$ (D) $x^2 + y^2$

Ans. : _____

(SPACE FOR ROUGH WORK)

18. In the given figure, *AC*, *CE* and *EH* are tangents drawn to the circle at *B*, *D* and *F* respectively. If *CB* = 5 cm, and *EF* = 3 cm, then the length of *CE* is



(A) 2 cm (B) 5 cm

(C) 3 cm (D) 8 cm.

Ans. : _____

19. The formula to find the coefficient of variation is

(A) $\frac{\sigma}{\overline{X}} \times 100$ (B) $\frac{\overline{X}}{\sigma} \times 100$

(C) $\frac{\overline{X}}{100} \times \sigma$ (D) $\frac{\sigma}{100} \times \overline{X}$

Ans. : _____

20. If the circumference of the base of a cylinder is 44 cm and height 20 cm, then its lateral surface area is

(A) 440 sq. cm (B) 880 sq.cm

(C) 88 sq.cm (D) 44 sq.cm.

Ans. : _____

(SPACE FOR ROUGH WORK)

II. Fill in the blanks with suitable answers : $10 \times 1 = 10$

21. If A and B are the subsets of the universal set U then

$(A \cup B)' = \ldots\ldots\ldots\ldots\ldots\ldots$.

Ans. : _____

22. If A is a matrix of order ($m \times n$) and B is a matrix of order ($n \times p$) then order of AB is $\ldots\ldots\ldots\ldots\ldots\ldots$.

Ans. : _____

23. The value of ${}^{n}P_{0}$ is $\ldots\ldots\ldots\ldots\ldots\ldots$.

Ans. : _____

24. Rationalising factor of $(\sqrt{x+y})$ is $\ldots\ldots\ldots\ldots\ldots\ldots$.

Ans. : _____

25. The standard form of the quadratic equation is $\ldots\ldots\ldots\ldots\ldots\ldots$.

Ans. : _____

(SPACE FOR ROUGH WORK)

26. If the value of the discriminant of the quadratic equation $ax^2 + bx + c = 0$ is less than 0 then the nature of the roots is ..... .

Ans. : _____

27. If R and r are the radii of two circles having their centres d cm apart, then the length of the transverse common tangent t is ..... .

Ans. : _____

28. If the square on one side of a triangle is equal to the sum of the squares on the other two sides, then those two sides contain ..... .

Ans. : _____

29. The formula to find volume of a right circular cylinder is ..... .

Ans. : _____

30. Shape of each face of Dodecahedron is ..... .

Ans. : _____

(SPACE FOR ROUGH WORK)

III. 31. Which term of the Geometric Progression 2, $2\sqrt{2}$, 4, ... is 64 ? 2

(SPACE FOR ROUGH WORK)

32. Find the sum of the series 1 + 2 + 4 + ... up to 9 terms.

[using the formula] 2

(SPACE FOR ROUGH WORK)

33. Three numbers are in harmonic progression. The harmonic mean between first and third numbers is 20. If the 1st number is twice the third number, find the three terms of the progression. 2

(SPACE FOR ROUGH WORK)

34. What is meant by transposing of a matrix ? Give an example. 2

(SPACE FOR ROUGH WORK)

35. (a) What is fundamental counting principle ?

(b) What is the meaning of ${}^{n}P_{r}$? 2

(SPACE FOR ROUGH WORK)

36. There are 3 white and 5 red roses in a basket. In how many ways can 4 flowers be removed from the basket so that they contain 2 red flowers ? 2

(SPACE FOR ROUGH WORK)

37. The H.C.F. and L.C.M. of two expressions are $(a - 7)$ and $(a^3 - 10a^2 + 11a + 70)$ respectively. If one of the expressions is $(a^2 - 12a + 35)$, find the other. 2

(SPACE FOR ROUGH WORK)

38. Rationalise the denominator and simplify :

$$\frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}} \ .$$ 2

(SPACE FOR ROUGH WORK)

39. By selling an article for Rs. 18·75, a dealer loses as much per cent as its cost price. Find the cost price of the article. 2

(SPACE FOR ROUGH WORK)

40. Solve the equation by using the fomula $x^2 - 8x + 1 = 0$. 2

(SPACE FOR ROUGH WORK)

41. What is a pure quadratic equation ? Give an example. 2

(SPACE FOR ROUGH WORK)

42. For what value of k the equation $kx^2 + 6x + 1 = 0$ has equal roots ? 2

(SPACE FOR ROUGH WORK)

43. Construct two tangents to a circle of radius 3·5 cm from a point 4·5 cm away from the circle. 2

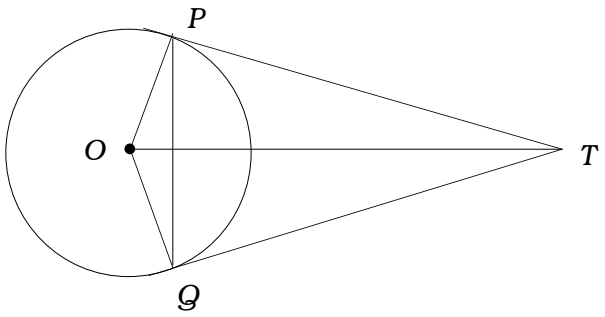
(SPACE FOR ROUGH WORK)

44. *ABCD* is a rhombus. Prove that

$AC^2 + BD^2 = 4\,AB^2$. 2

(SPACE FOR ROUGH WORK)

45. In the given figure, TP and TQ are tangents drawn to a circle with centre O. Prove that $\angle PTQ = 2 \angle OPQ$. 2



(SPACE FOR ROUGH WORK)

46. Draw a plan for the recordings from the Surveyor's field book given below : 2

[Scale : 20 m = 1 cm]

	Metres to D	
To E 80	160 120 100 60	 60 to C 40 to B
	From A	

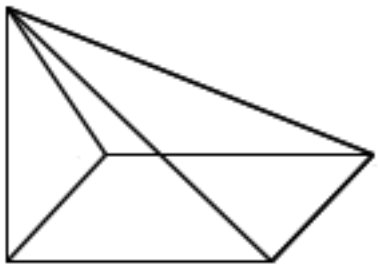
(SPACE FOR ROUGH WORK)

47. Draw a network for the following matrix : 2

$$\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 1 \\ 2 & 1 & 0 \end{bmatrix} .$$

(SPACE FOR ROUGH WORK)

48. Verify Euler's formula for the given solid. 2



(SPACE FOR ROUGH WORK)

IV. 49. In an examination 82% of the candidates passed in Maths, 72% passed in Science and 55% passed in both. Find the percentage of students failed in both.

(Draw Venn diagram to verify) 3

(SPACE FOR ROUGH WORK)

50. Calculate the Mean and Standard Deviation for the following distribution : 3

Class-interval	***Frequency***
0 – 4	2
5 – 9	3
10 – 14	10
15 – 19	3
20 – 24	2

(SPACE FOR ROUGH WORK)

51. Find the L.C.M. of $x^3 - 2x^2 - 13x - 10$ and $x^3 - x^2 - 10x - 8$. 3

(SPACE FOR ROUGH WORK)

(SPACE FOR ROUGH WORK)

52. If $a + b + c = abc$, show that

$$\frac{a\left(b^2c^2 - 1\right)}{bc + 1} + \frac{b\left(c^2a^2 - 1\right)}{ca + 1} + \frac{c\left(a^2b^2 - 1\right)}{ab + 1} = 2abc.$$ 3

(SPACE FOR ROUGH WORK)

53. If two circles touch each other externally, prove that their point of contact and their centres are collinear. 3

(SPACE FOR ROUGH WORK)

54. Find the total surface area of a sphere whose volume is equal to the volume of the cone having the radius 12 cm and height 6 cm. 3

(SPACE FOR ROUGH WORK)

V. 55. In an Arithmetic progression the first term is 2 and the sum of the first five terms is one fourth of the next five terms. Show that the 20th term is equal to – 112. 4

(SPACE FOR ROUGH WORK)

56. Two circles of radii 4 cm and 2 cm, have their centres 10 cm apart. Draw two direct common tangents and measure their length and write. 4

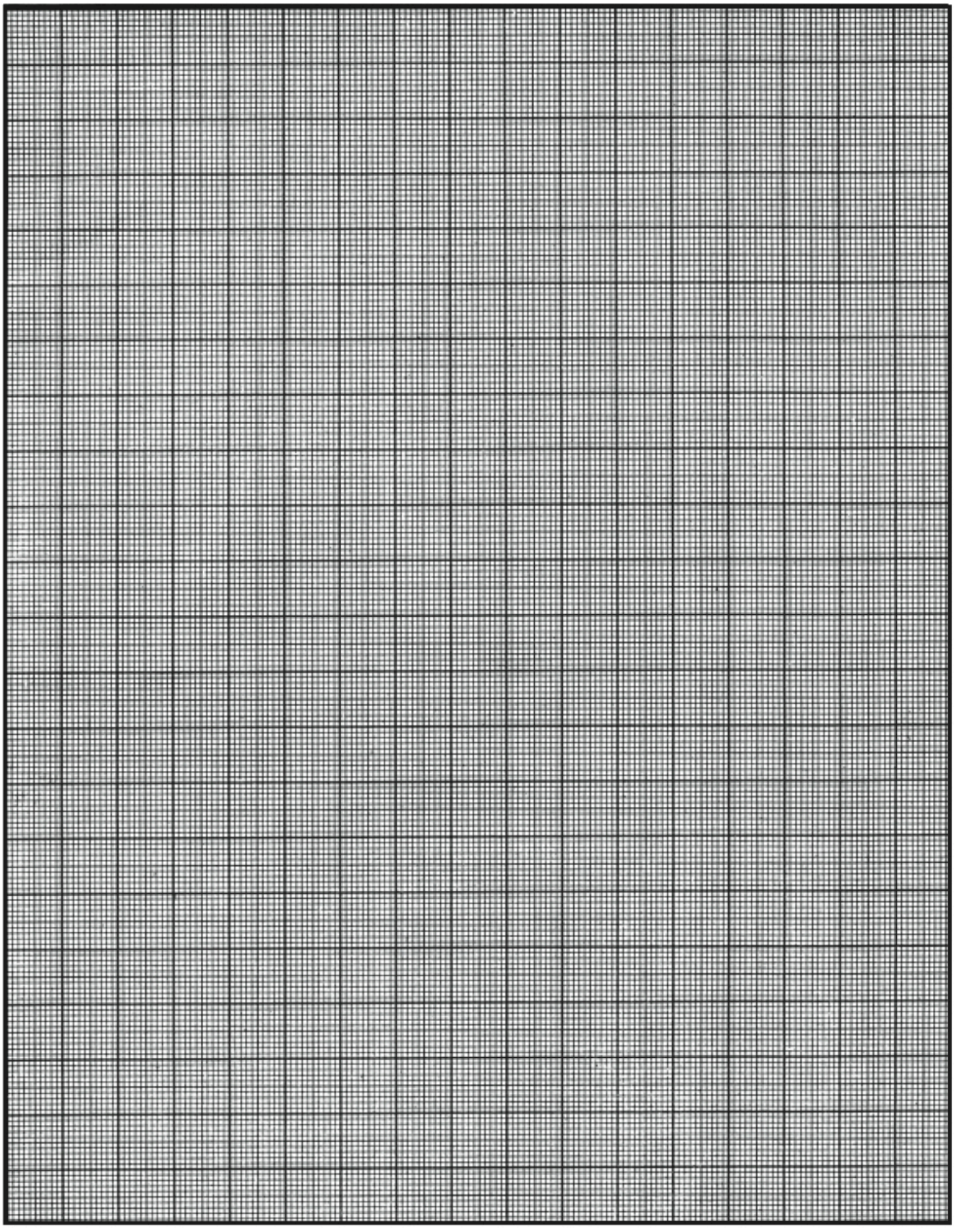
(SPACE FOR ROUGH WORK)

57. If two triangles are equiangular, prove that their corresponding sides are proportional. 4

(SPACE FOR ROUGH WORK)

58. Draw the graph of $y = x^2$ and $y = 3 - 2x$ and hence solve the equation $x^2 + 2x - 3 = 0$. 4

(SPACE FOR ROUGH WORK)



ಕರ್ನಾಟಕ ಪ್ರೌಢ ಶಿಕ್ಷಣ ಪರೀಕ್ಷಾ ಮಂಡಳಿ, ಮಲ್ಲೇಶ್ವರಂ, ಬೆಂಗಳೂರು – 560 003

KARNATAKA SECONDARY EDUCATION EXAMINATION BOARD, MALLESWARAM, BANGALORE – 560 003

ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ. ಪರೀಕ್ಷೆ, ಏಪ್ರಿಲ್ — 2013

S. S. L. C. EXAMINATION, APRIL, 2013

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ದಿನಾಂಕ : 08. 04. 2013]

Date : 08. 04. 2013]

ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

CODE NO. : 81-E

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

[ಪರಮಾವಧಿ ಅಂಕಗಳು : **100**

[Max. Marks : 100

(English Version)

Qn. Nos.	Letter of the answer	Value Points	Marks Allotted
I. 1.	A	$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$	1
2.	C	$\sqrt{10}$	1
3.	A	$\begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix}$	1
4.	D	13	1
5.	B	$5x^2y^2$	1
6.	D	$p^2 + q^2 + r^2$	1
7.	C	0	1
8.	C	$a^2 + b^2 - ab$	1
9.	A	5	1
10.	C	$2\sqrt[3]{x}$	1

Qn. Nos.	Letter of the answer	Value Points	Marks Allotted
11.	B	$\pm$ 4·5	1
12.	A	$x^2 - 4x + 1 = 0$	1
13.	C	5	1
14.	B	{ 0, 1, 2, 3 }	1
15.	B	$\frac{1}{4} \Delta ABC$	1
16.	D	$\frac{AY}{CY}$	1
17.	C	$2\sqrt{xy}$	1
18.	D	8 cm.	1
19.	A	$\frac{\sigma}{\bar{X}} \times 100$	1
20.	B	880 sq.cm	1
II.			
21.		$A' \cap B'$	1
22.		$m \times p$	1
23.		1	1
24.		$\sqrt{x + y}$	1
25.		$ax^2 + bx + c = 0$	1
26.		Imaginary	1
27.		$t = \sqrt{d^2 - (R + r)^2}$	1
28.		Right angle (90°)	1
29.		$V = \pi r^2 h$	1
30.		Regular pentagon.	1

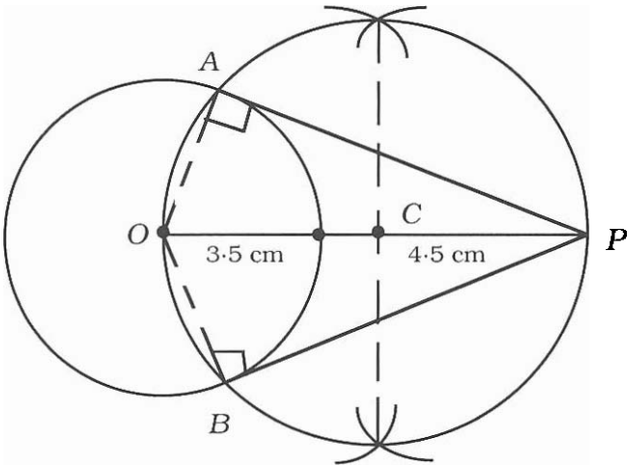
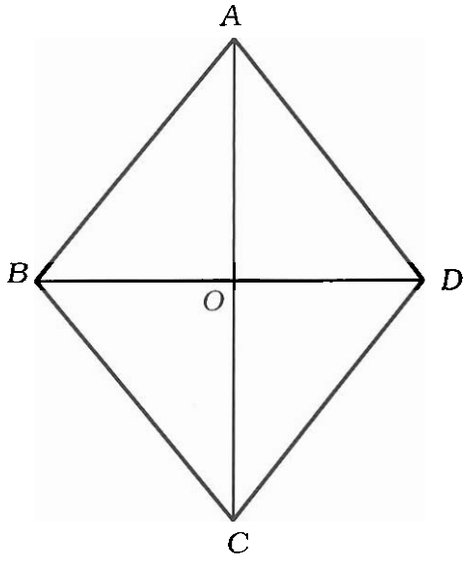
Qn. Nos.	Value Points	Marks Allotted	
31.	$2,\ 2\sqrt{2},\ 4,\ \ldots\ldots$		
	Here $a = 2, \quad T_n = 64$		
	$r = \frac{2\sqrt{2}}{2} =$	$\frac{1}{2}$	
	$T_n = a.r^{n-1}$		
	$64 = 2 . \left(\sqrt{2}\right)^{n-1}$	$\frac{1}{2}$	
	$\therefore \left(\sqrt{2}\right)^{n-1} = 32$		
	$2^{\frac{1}{2}(n-1)} = 32$	$\frac{1}{2}$	
	$2^{\frac{n-1}{2}} = 2^5$		
	$\therefore \frac{n-1}{2} = 5$		
	$\therefore n - 1 = 5 \times 2$	$\frac{1}{2}$	
	$\therefore n - 1 = 10$		
	$\therefore n = 10 + 1$		2
	$\therefore$ $\boxed{n = 11}$		
32.	$1 + 2 + 4 + \ldots\ldots$ up to 9 terms.		
	Here $a = 1,\ r = \frac{2}{1} = \frac{4}{2} = 2$		
	$n = 9$	$\frac{1}{2}$	
	$\therefore S_n = a\left[\frac{r^n - 1}{r - 1}\right],\ r > 1$	$\frac{1}{2}$	
	$= 1\left[\frac{2^9 - 1}{2 - 1}\right]$	$\frac{1}{2}$	
	$= \frac{256 - 1}{1}$		
	$= 255.$	$\frac{1}{2}$	2

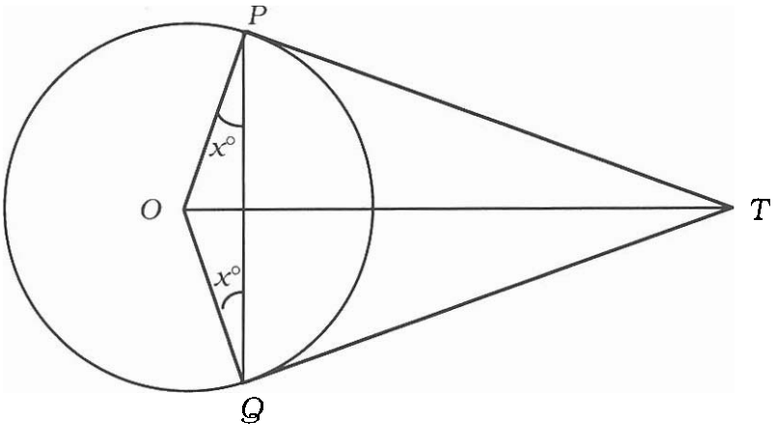
Qn. Nos.	Value Points	Marks Allotted	
33.	Let the three terms in harmonic progression are x, y, z.		
	$H = \frac{2ab}{a+b}$	$\frac{1}{2}$	
	Here $a = x = 2z$		
	$b = z$		
	$H = y = 20$		
	$\therefore \quad H = \frac{2 \times 2z \times z}{2z + z}$	$\frac{1}{2}$	
	$= \frac{4z^2}{3z} = \frac{4}{3}z$		
	$\therefore \quad 20 = \frac{4}{3}z$		
	$\therefore \quad 4z = 20 \times 3$		
	$= 60$		
	$\therefore \quad z = \frac{60}{4} = 15$	$\frac{1}{2}$	
	$\therefore \quad x = 2z = 2 \times 15 = 30$		
	$\therefore$ The three terms are 30, 20, 15.	$\frac{1}{2}$	2
34.	The matrix obtained by interchanging rows into columns or columns into rows is called transposing of a matrix.	1	
	Example $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$		
	$\therefore \quad A' = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$	1	2
	Note : Any suitable example may be considered.		
35.	a) If one event occurs in m different ways and another event occurs independently in n different ways then the two events together can be done in ($m \times n$) different ways. This is called fundamental counting principle.	1	
	b) ${}^nP_r$ means the number of permutations of n things taking r things at a time.	1	2

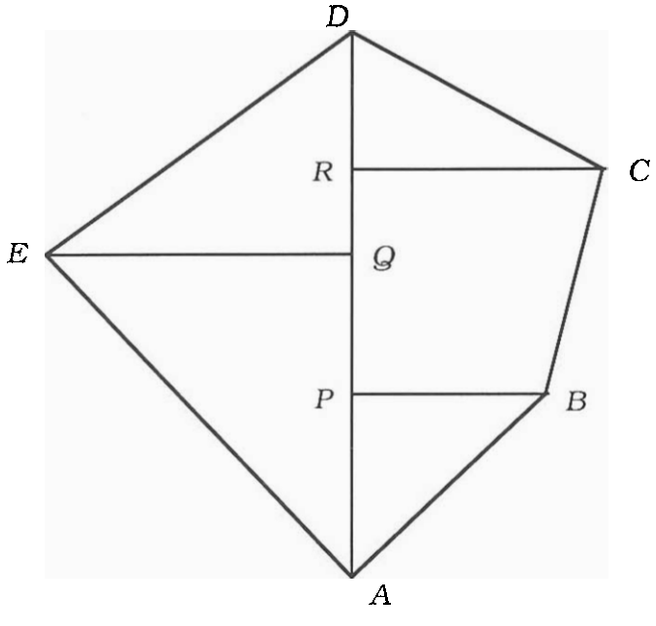
Qn. Nos.	Value Points	Marks Allotted	
36.	There are 5 red flowers. The number of ways in which 2 flowers can be removed from 5 red flowers is ${}^5C_2$.	$\frac{1}{2}$	
	Then remaining 2 flowers from 3 white flowers in ${}^3C_2$ ways.	$\frac{1}{2}$	
	$\therefore$ Total number of ways		
	$= {}^5C_2 \times {}^3C_2$	$\frac{1}{2}$	
	$= \frac{5 \times \cancel{4}^{\,2}}{\cancel{2} \times 1} \times \frac{3 \times \cancel{2}}{\cancel{2} \times 1}$		
	$= 10 \times 3$		
	$= 30$	$\frac{1}{2}$	2
37.	$H = (a - 7)$		
	$L = (a^3 - 10a^2 + 11a + 70)$		
	$A = (a^2 - 12a + 35)$		
	$B = ?$		
	$A \times B = H \times L$		
	$\therefore \quad B = \frac{H \times L}{A} = H \times \frac{L}{A}$	$\frac{1}{2}$	
	$\frac{L}{A} = \frac{a^3 - 10a^2 + 11a + 70}{a^2 - 12a + 35}$		
	$a + 2$		
	$a^2 - 12a + 35 \;)\; a^3 - 10a^2 + 11a + 70$		
	$\cancel{a^3} - 12a^2 + 35a$		
	(–) (+) (–)		
	$2\cancel{a}^2 - 24\cancel{a} + \cancel{70}$		
	$2a^2 - \cancel{2}4a + \cancel{7}0$	1	
	(–) (+) (–)		
	0 0 0		
	$\therefore \quad B = (a - 7)(a + 2)$		
	$= a^2 - 5a - 14.$	$\frac{1}{2}$	2

Qn. Nos.	Value Points	Marks Allotted	
38.	$\frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}}$		
	Rationalising factor of denominator is $\sqrt{5}+\sqrt{2}$	$\frac{1}{2}$	
	$\frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}} \times \frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}+\sqrt{2}}$	$\frac{1}{2}$	
	$= \frac{(\sqrt{5}+\sqrt{2})^2}{(\sqrt{5})^2-(\sqrt{2})^2}$		
	$= \frac{(\sqrt{5})^2+2\times\sqrt{5}\times\sqrt{2}+(\sqrt{2})^2}{5-2}$		
	$= \frac{5+2\sqrt{10}+2}{3}$	$\frac{1}{2}$	
	$= \frac{7+2\sqrt{10}}{3}$	$\frac{1}{2}$	2
39.	Let the cost price be Rs. x		
	Selling price = Rs. 18·75		
	Loss = Cost price – Selling price		
	$\frac{x}{100}\times x = x - 18{\cdot}75$	$\frac{1}{2}$	
	$\frac{x^2}{100} = x - 18{\cdot}75$		
	$x^2 = 100x - 1875$		
	$\therefore\ x^2 - 100x + 1875 = 0$	$\frac{1}{2}$	
	$(x-75)(x-25) = 0$		
	$\therefore\ x = 75$ or $x = 25$	$\frac{1}{2}$	
	The cost price is Rs. 75 or Rs. 25.	$\frac{1}{2}$	2
40.	$x^2 - 8x + 1 = 0$		
	Compare the equation with standard form		
	$a = 1,\quad b = -8,\quad c = 1$		

Qn. Nos.	Value Points	Marks Allotted	
	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	$\frac{1}{2}$	
	$= \frac{-(-8) \pm \sqrt{(-8)^2 - 4 \times 1 \times 1}}{2 \times 1}$	$\frac{1}{2}$	
	$= \frac{8 \pm \sqrt{64 - 4}}{2}$		
	$= \frac{8 \pm \sqrt{60}}{2}$	$\frac{1}{2}$	
	$= \frac{8 \pm \sqrt{4 \times 15}}{2}$		
	$= \frac{8 \pm 2\sqrt{15}}{2}$		
	$= \frac{\cancel{2}\left(4 \pm \sqrt{15}\right)}{\cancel{2}}$		
	$= 4 \pm \sqrt{15}$.	$\frac{1}{2}$	2
41.	An equation that can be expressed in the form $ax^2 + c = 0$, where a and c are real numbers and $a \neq 0$ is a pure quadratic equation. Or the quadratic equation having only second degree variable is called a pure quadratic equation.	1	
	One example : $x^2 - 9 = 0$	1	2
	Note : Any suitable example may be considered.		
42.	$kx^2 + 6x + 1 = 0$		
	This is in the form $ax^2 + bx + c = 0$		
	Here $a = k$, $b = 6$, $c = 1$		
	$\Delta = b^2 - 4ac$	$\frac{1}{2}$	
	Since the roots are equal,		
	$b^2 - 4ac = 0$ $\quad (\because \Delta = 0)$	$\frac{1}{2}$	
	$(6)^2 - 4 \times k \times 1 = 0$	$\frac{1}{2}$	
	$36 - 4k = 0$		
	$4k = 36$		
	$\therefore \quad k = \frac{36}{4} = 9$		
	$\therefore \quad \boxed{k = 9}$	$\frac{1}{2}$	2

Qn. Nos.	Value Points	Marks Allotted	
43.			
	AP and *BP* are tangents		
	For 3·5 cm circle	$\frac{1}{2}$	
	OP drawn	$\frac{1}{2}$	
	Midpoint *C* construction	$\frac{1}{2}$	
	AP and *BP* construction.	$\frac{1}{2}$	2
44.			
	ABCD is a rhombus.		
	AC and *BD* are diagonals. They bisect perpendicularly at *O*.		
	$\therefore \quad AO = \frac{1}{2} AC$ and $BO = \frac{1}{2} BD$	$\frac{1}{2}$	

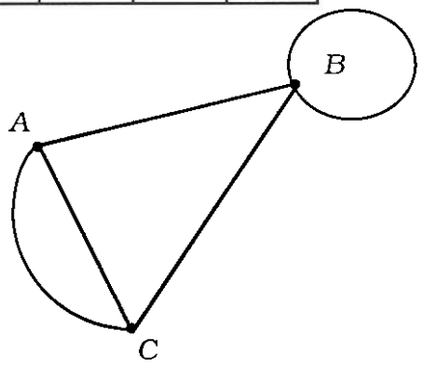
Qn. Nos.	Value Points	Marks Allotted	
	In right angled ΔAOB, $A\hat{O}B = 90°$		
	According to Pythagoras theorem,		
	$AB^2 = AO^2 + BO^2$	$\frac{1}{2}$	
	$= \left(\frac{1}{2}AC\right)^2 + \left(\frac{1}{2}BD\right)^2$		
	$= \frac{1}{4}AC^2 + \frac{1}{4}BD^2$	$\frac{1}{2}$	
	$\therefore \quad AB^2 = \frac{1}{4}\left(AC^2 + BD^2\right)$		
	$\therefore \quad \boxed{AC^2 + BD^2 = 4AB^2}$	$\frac{1}{2}$	2
45.			
	$OP \perp PT$		
	$\therefore \quad \angle OPT = 90°$	$\frac{1}{2}$	
	Let $\angle OPQ = x°$		
	$\angle QPT = 90° - x°$		
	Similarly $\angle PQT = 90° - x°$	$\frac{1}{2}$	

Qn. Nos.	Value Points	Marks Allotted	
	In ΔPQT		
	$\angle PTQ + \angle QPT + \angle PQT = 180°$ $\angle PTQ + 90° - x° + 90° - x° = 180°$	$\frac{1}{2}$	
	$\angle PTQ + 180° - 2x° = 180°$		
	$\therefore \quad \angle PTQ = 2x°$		
	$\therefore \quad \angle PTQ = 2 \angle OPQ.$	$\frac{1}{2}$	2
46.	Scale 20 m = 1 cm		
	i) $\frac{160}{20}$ = 8 cm		
	ii) $\frac{120}{20}$ = 6 cm		
	iii) $\frac{100}{20}$ = 5 cm		
	iv) $\frac{60}{20}$ = 3 cm		
	v) $\frac{40}{20}$ = 2 cm		
	vi) $\frac{80}{20}$ = 4 cm.	$\frac{1}{2}$	
		$1\frac{1}{2}$	2

Qn. Nos.	Value Points	Marks Allotted	
47.			

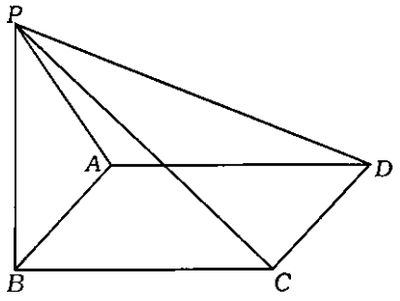
	A	*B*	*C*
A	0	1	2
B	1	2	1
C	2	1	0

$\frac{1}{2}$



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

48.



Here $F = 5$

$V = 5$

$E = 8$ $\frac{1}{2}$

$F + V = 5 + 5 = 10$ ..... (i) $\frac{1}{2}$

$E + 2 = 8 + 2 = 10$ ..... (ii) $\frac{1}{2}$

From (i) and (ii)

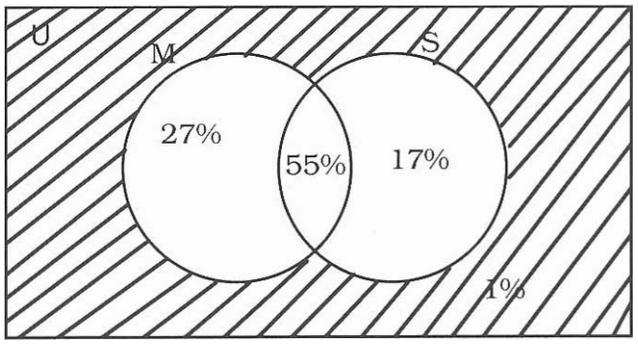
$\boxed{F + V = E + 2}$ $\frac{1}{2}$ 2

49. Number of candidates appeared for examination = $n(U) = 100$

Number of candidates passsed in Maths = $n(M) = 82\%$

Number of candidates passed in Science = $n(S) = 72\%$

Number of candidates passed in both = $n(M \cap S) = 55\%$

Qn. Nos.	Value Points	Marks Allotted	
	Total number of candidates passed = $n(M \cup S)$		
	$n(M \cup S) = n(M) + n(S) - n(M \cap S)$	$\frac{1}{2}$	
	$= 82\% + 72\% - 55\%$	$\frac{1}{2}$	
	$= 99\%$	$\frac{1}{2}$	
	$\therefore$ Number of failed candidates		
	$= n(\cup) - n(M \cup S)$		
	$= 100 - 99$		
	$= 1\%$	$\frac{1}{2}$	
		1	3
50.			

C.I.	f	x	fx	$x - \bar{x} = D$	D^2	fD^2
0 – 4	2	2	4	– 10	100	200
5 – 9	3	7	21	– 5	25	75
10 – 14	10	12	120	0	0	0
15 – 19	3	17	51	5	25	75
20 – 24	2	22	44	10	100	200

$N = 20$ $\quad \Sigma fx = 240$ $\quad \Sigma fd^2 = 550$

$\bar{X} = \frac{}{N}$ To find $\bar{X}$ 1

$= \frac{240}{20}$ To find D^2 $\frac{1}{2}$

$= 12$ $\Sigma f D^2$ $\frac{1}{2}$

Standard deviation = $\sigma = \sqrt{\frac{\Sigma fD^2}{N}}$ $\frac{1}{2}$

$= \sqrt{\frac{550}{20}}$

$= \sqrt{27{\cdot}5}$

$= 5{\cdot}24$ $\frac{1}{2}$ 3

Qn. Nos.	Value Points	Marks Allotted
51.		

	A	B	
1	$x^3 - 2x^2 - 13x - 10$ $x^3 - x^2 - 10x - 8$ (–) (+) (+) (+)	$x^3 - x^2 - 10x - 8$ $x^3 + 3x^2 + 2x$ (–) (–) (–)	x
	$-x^2 - 3x - 2$ $\therefore -(x^2 + 3x + 2)$	$-4x^2 - 12x - 8$ $-4x^2 - 12x - 8$ (+) (+) (+)	-4
		0 0 0	1

$\therefore$ H.C.F. $= x^2 + 3x + 2$ To find HCF $1\frac{1}{2}$

$\therefore \quad L = \dfrac{A \times B}{H}$

$= A \times \dfrac{B}{H}$ or $\dfrac{A}{H} \times B.$

$\dfrac{B}{H} = \dfrac{x^3 - x^2 - 10x - 8}{x^2 + 3x + 2}$

$x - 4$

$x^2 + 3x + 2 \;\big|\; x^3 - x^2 - 10x - 8$

$x^3 + 3x^2 + 2x$

(–) (–) (–)

$-4x^2 - 12x - 8$

$-4x^2 - 12x - 8$

(+) (+) (+)

0 0 0 Division 1

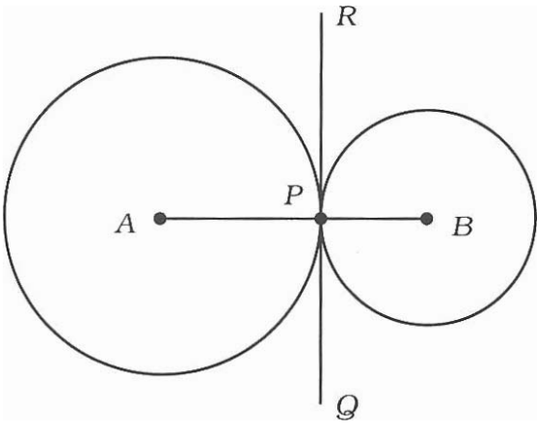
$\therefore \quad \dfrac{B}{H} = x - 4$

$\therefore \quad L = A \times \dfrac{B}{H}$

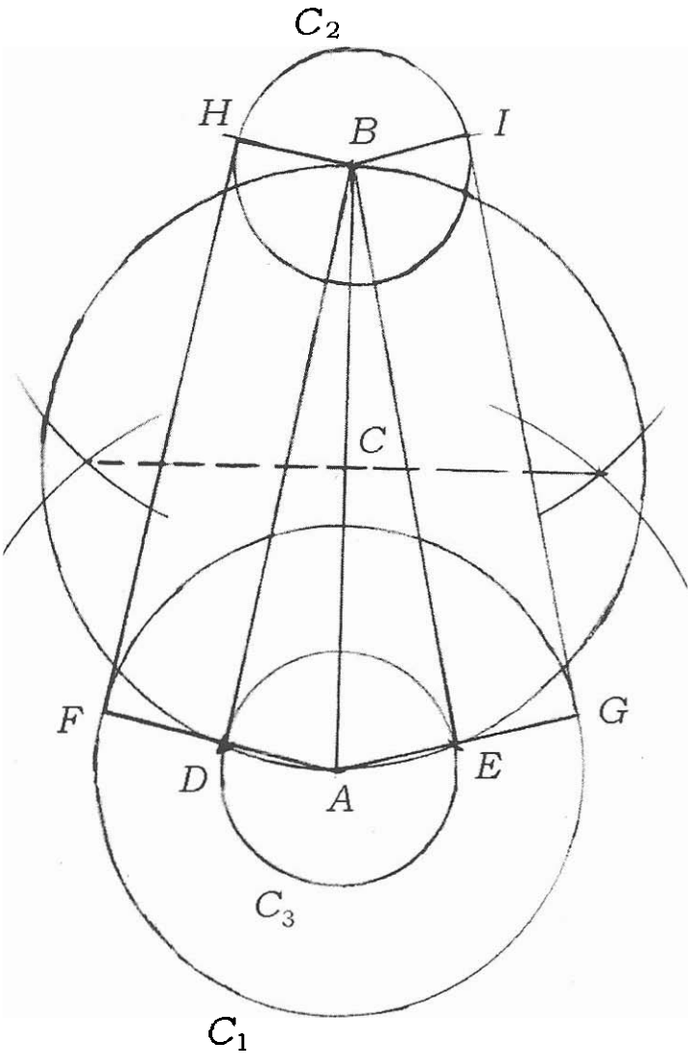
$= (x^3 - 2x^2 - 13x - 10)(x - 4)$ $\frac{1}{2}$ 3

OR

Qn. Nos.	Value Points	Marks Allotted	
	$L = \frac{A}{H} \times B$		
	$\frac{A}{H} = \frac{x^3 - 2x^2 - 13x - 10}{x^2 + 3x + 2}$		
	$x - 5$ $x^2 + 3x + 2 \;\overline{)\; x^3 - 2x^2 - 13x - 10}$ $x^3 + 3x^2 + 2x$ (–) (–) (–) $-5x^2 - 15x - 10$ $-5x^2 - 15x - 10$ (+) (+) (+) 0 0 0		
	$\therefore \quad \frac{A}{H} = (x - 5)$		
	$\therefore \quad L = (x - 5)\left(x^3 - x^2 - 10x - 8\right)$		3
52.	L.H.S. $= \frac{a\left(b^2c^2 - 1\right)}{bc + 1} + \frac{b\left(c^2a^2 - 1\right)}{ca + 1} + \frac{c\left(a^2b^2 - 1\right)}{ab + 1}$		
	$= \frac{a(bc - 1)(\cancel{bc + 1})}{\cancel{bc + 1}} + \frac{b(ca - 1)(\cancel{ca + 1})}{\cancel{ca + 1}} +$		
	$\frac{c(ab - 1)(\cancel{ab + 1})}{\cancel{ab + 1}}$	$\frac{1}{2}$	
	$= a(bc - 1) + b(ca - 1) + c(ab - 1)$	$\frac{1}{2}$	
	$= abc - a + abc - b + abc - c$	$\frac{1}{2}$	
	$= 3abc - a - b - c$	$\frac{1}{2}$	
	$= 3abc - abc \qquad [\because \quad a + b + c = abc]$	$\frac{1}{2}$	
	$= 2abc.$	$\frac{1}{2}$	3

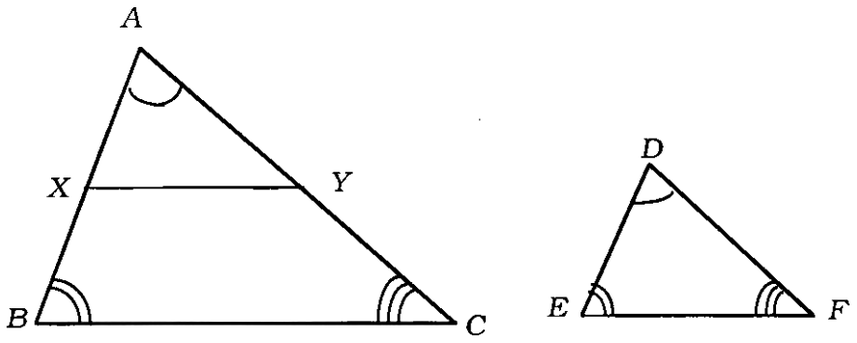
Qn. Nos.	Value Points	Marks Allotted	
53.	 fig.	$\frac{1}{2}$	
	Data : Two circles with centres A and B touch each other at P externally.	$\frac{1}{2}$	
	To Prove : A, B and P are collinear.	$\frac{1}{2}$	
	Proof : $\angle APQ = 90°$ (i) (Radius is perpendicular		
	$\angle BPQ = 90°$ (ii) to tangent)	$\frac{1}{2}$	
	Adding (i) and (ii)		
	$\angle APQ + \angle BPQ = 180°$	$\frac{1}{2}$	
	$\therefore$ **APB is a straight** line		
	$\therefore$ A, B and P are collinear.	$\frac{1}{2}$	3
54.	Volume of sphere = volume of cone		
	$\therefore \quad \frac{4}{3}\pi r^3 = \frac{1}{3}\pi r^2 h$	$\frac{1}{2} + \frac{1}{2}$	
	$\frac{4}{3} \times \frac{22}{7} \times r^3 = \frac{1}{3} \times \frac{22}{7} \times 12 \times 12 \times 6$	$\frac{1}{2}$	
	$4\, r^3 = 12 \times 12 \times 6$		
	$r^3 = \frac{12^3 \times 12 \times 6}{4}$		
	$\therefore \quad r^3 = 216$		
	$\therefore \quad r = \sqrt[3]{216}$		
	$r = 6$ cm	$\frac{1}{2}$	
	Total surface are of a sphere $= 4\pi r^2$	$\frac{1}{2}$	
	$= 4 \times \frac{22}{7} \times 6 \times 6$		
	T.S.A. of a sphere = 452·57 sq.cm	$\frac{1}{2}$	3

Qn. Nos.	Value Points	Marks Allotted
55.	In an Arithmetic Progression $a = 2$	
	$a + (a + d) + (a + 2d) + (a + 3d) + (a + 4d) =$	
	$\frac{1}{4}[(a + 5d) + (a + 6d) + (a + 7d) + (a + 8d) + (a + 9d)]$	1
	$\therefore \quad 5a + 10d = \frac{1}{4}[5a + 35d]$	
	Substitute $a = 2$	
	$5 \times 2 + 10d = \frac{1}{4}[5 \times 2 + 35d]$	$\frac{1}{2}$
	$10 + 10d = \frac{1}{4}[10 + 35d]$	
	$4(10 + 10d) = 10 + 35d$	
	$40 + 40d = 10 + 35d$	$\frac{1}{2}$
	$\therefore \quad 40d - 35d = 10 - 40$	
	$5d = -30$	$\frac{1}{2}$
	$\therefore \quad d = \frac{-30}{5} = -6$	
	$\therefore \quad \boxed{d = -6}$	$\frac{1}{2}$
	20th term in A.P. $= a + 19d$	$\frac{1}{2}$
	$= 2 + 19(-6)$	
	$= 2 + (-114)$	
	$= -112.$	$\frac{1}{2}$ 4
	$\therefore \quad \boxed{T_{20} = -112}$	
	Note : Any other correct method may be considered and for correct answer full marks may be given.	

Qn. Nos.	Value Points	Marks Allotted	
56.			
	Here d = 10 cm, R = 4 cm, r = 2 cm and $R - r = 4 - 2 = 2$ cm.		
	For C_1, C_2, C_3 circles	$1\frac{1}{2}$	
	Distance between two centres of circles — AB	$\frac{1}{2}$	
	To find mid-point C	$\frac{1}{2}$	
	Construction of tangents BD and BE	$\frac{1}{2}$	
	Construction of tangents FH and GI	$\frac{1}{2}$	
	Length of tangents $FH = GI$ = 9·7 cm or 9·8 cm.	$\frac{1}{2}$	4

Qn. Nos.	Value Points	Marks Allotted

57.



$\frac{1}{2}$

Data : In triangles ΔABC and ΔDEF

$\angle BAC = \angle EDF$

$\angle ABC = \angle DEF$

and $\angle ACB = \angle DFE$ $\frac{1}{2}$

To prove : $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ $\frac{1}{2}$

Construction : Mark X on AB, Y on AC, such that

$AX = DE$ and $AY = DF$. Join XY. $\frac{1}{2}$

Proof :

Statement	***Reasons***	
In ΔAXY and ΔDEF, $\angle A = \angle D$,	Data	$\frac{1}{2}$
$AX = DE$, $AY = DF$	Construction	
$\therefore$ $\Delta AXY \equiv \Delta DEF$	S.A.S. postulate	$\frac{1}{2}$
$\therefore$ $XY = EF$ and $\angle AXY = \angle DEF$	Congruent triangle property	
$\angle AXY = \angle DEF = \angle ABC$	Data	
i.e., $\angle AXY = \angle ABC$	$\angle AXY$ and $\angle ABC$ are	
$\therefore$ $XY \parallel BC$ ... (i)	$\because$ corresponding angles	$\frac{1}{2}$
$\therefore$ $\frac{AB}{AX} = \frac{AC}{AY} = \frac{BC}{XY}$	B.P.T. and corollary	
i.e., $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$	From construction and (i)	$\frac{1}{2}$ 4

Qn. Nos.	Value Points	Marks Allotted	
58.	$y = x^2$		

x	0	1	– 1	2	– 2	3	– 3
y	0	1	1	4	4	9	9

1

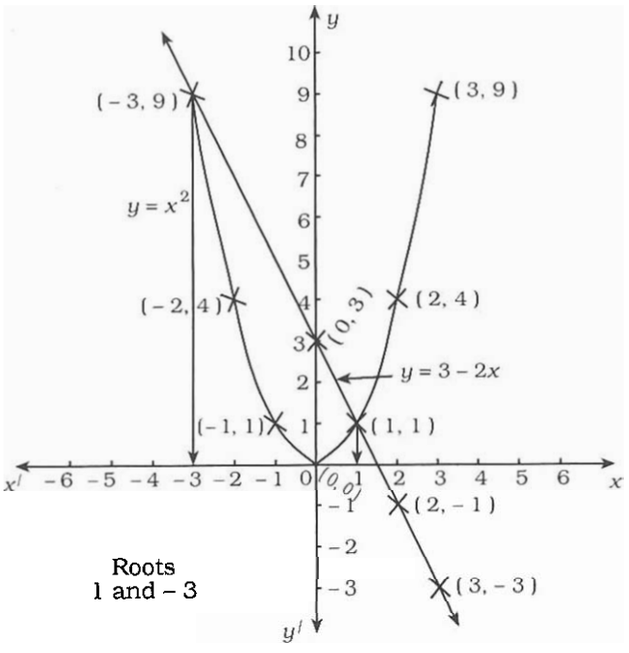
$y = 3 - 2x$

x	0	1	2	3	– 1	– 2
y	3	1	– 1	– 3	5	7

1

Scale : x-axis : 1 cm = 1 unit

y-axis : 1 cm = 1 unit



To draw parabola $\frac{1}{2}$

To draw straight line $\frac{1}{2}$

To draw perpendicular $\frac{1}{2}$

To write the roots $\frac{1}{2}$ 4