KENDRIYA VIDYALAYA SANGATHAN, REGIONAL OFFICE LUCKNOW MARKING SCHEME

Time: Subject: Mathematics-Basic (241)

Time Allowed: 3 Hours Maximum Marks: 80

General Instructions:

1.This question paper has 5 sections A-E

- 2. Section A has 20 MCQs carrying 1 mark each.
- **3.** Section B has 5 questions carrying 02 marks each.
- 4. Section C has 6 questions carrying 03 marks each.
- **5.** Section D has 4 questions carrying 05 marks each.
- **6.** section E has 3 case based integrated units of assessment (04 marks each) with sub parts of the values 1, 1 and 2 marks each respectively.
- 7. All questions are compulsory. However internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Qs of 2 marks has been provided. An internal choice has been provided in 2 marks questions of section E.

8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$, wherever required if not stated.

	8. Draw neat figures wherever required. Take $\pi = \frac{2\pi}{7}$, wherever required if not stated.	
Q.	Section-A	Marks
No.	2	1
	c) xy^2	
2	a) 18	1
3	b) 128	1
4	b) at most two zeros	1
5	c) degree	1
6	c) no solution	1
7	b) $x(x + 1) + 8 = (x + 2)(x - 2)$	1
8	b) 47	1
9	d) 1, -2, 3, -4, 5, -6,	1
10	c) 2	1
11	a) 4	1
12	(b) $\sqrt{3} p$	1
13	c) $\angle B = \angle D$	1
14	c) $\frac{1}{2}$	1
15	a) 1	1
16	d) 90°	1
17	(d) 15 m	1
18	c) 30°	1
19	d) 90°	1
20	c) $\frac{\theta}{360^0} \times \pi r^2$	1
	Section-B	
21	We have, $7 \times 11 \times 13 + 13 = 13 \times (7 \times 11 + 1)$	1/2
	$=13\times(77 + 1) = 13\times(78)$	1/2
	$= 13 \times 2 \times 3 \times 13$	1/2
		1/2

	Since given number has more than two featers, therefore it is composite number	
	Since given number has more than two factors, therefore it is composite number. OR	
	7 140	1
	$ \begin{array}{c cccc} 7 & 140 \\ 5 & 20 \\ 2 & 4 \\ 2 & 2 \end{array} $	1
	2 4	
	2 2	
	_ <u></u>	1
	Therefore, $140 = 7 \times 5 \times 2 \times 2$	
22	For correct use of section formula	1
	For finding correct ratio i.e. 2:7	1
23	For using Pythagoras theorem and finding OP = 25 cm	1
	For finding $PR = OP + OR = 25 \text{ cm} + 7 \text{ cm} = 32 \text{ cm}$	1
24	For using Pythagoras theorem	1
	For finding $\cos^2 A + \sin^2 A = 1$	1
	For initiality $\cos A + \sin A = 1$	
	OR	
	$LHS = \frac{1 + \sec sec A}{\sec sec A} = \frac{1 + \frac{1}{\cos sos A}}{\frac{1}{1}} = \frac{A+1)/\cos sos A}{1/\cos sos A} = \cos sos A + 1$	
	coscos 4	
	and RHS = $\frac{\sin^2 A}{1 - \cos\cos A} = \frac{1 - \cos^2 A}{1 - \cos\cos A} = \frac{(1 - \cos\cos A)(1 + \cos A)}{(1 - \cos\cos A)} = 1 + \cos\cos A$	
	∴ LHS = RHS, hence proved.	1
25		1
	For calculating angle described by the minute hand in 5 minutes = $\left(\frac{360}{60} \times 5\right)^0 = 30^0$	
	For calculating area swept by the minute hand in 5 minutes = $\left(\frac{\theta}{360^{\circ}} \times \pi r^2\right)$	
		1
	$= \left(\frac{30^{\circ}}{360^{\circ}} \times \frac{22}{7} \times 14 \times 14\right) = \frac{154}{3} cm^{2}$	
	Section-C	1
26	Let us assume, that $\sqrt{5}$ is rational number.	1/2
		'2
	i.e. $\sqrt{5} = x/y$ (where, x and y are co-primes)	
	$y\sqrt{5}=x$	
	Squaring both the sides, we get,	
		1./
	$\Rightarrow 5y^2 = x^2 \dots (1)$	1/2
	Thus, x^2 is divisible by 5, so x is also divisible by 5.	
	Let us say, $x = 5k$, for some value of k and substituting the value of x in equation (1), we	
	get,	
	$5y^2 = (5k)^2$	
	$\Rightarrow y^2 = 5k^2$	1
	\Rightarrow y ² is divisible by 5 it means y is divisible by 5.	1
	Clearly, x and y are not co-primes. Thus, our assumption about $\sqrt{5}$ is rational is incorrect.	
	Hence, $\sqrt{5}$ is an irrational number.	

27	For applying correct similarity criteria For showing $\frac{OA}{OC} = \frac{OB}{OD}$	2 1
28	Given here,	
	In ΔOPQ, AB PQ	
	By using Basic Proportionality Theorem,	
	OA/AP = OB/BQ(i)	1
	Also given,	
	In ΔOPR, AC PR	
	By using Basic Proportionality Theorem	
	$\therefore OA/AP = OC/CR(ii)$	
	From equation (i) and (ii), we get,	
	OB/BQ = OC/CR	
	Therefore, by converse of Basic Proportionality Theorem,	1
	In $\triangle OQR$, BC \parallel QR.	
29	The figure given is:	
	D R C B	
	From this figure we can conclude a few points which are:	
	(i) DR = DS	
	(ii) BP = BQ	
	(iii) AP = AS	1
	(iv) $CR = CQ$	
	Since they are tangents on the circle from points D, B, A, and C respectively.	
	Now, adding the LHS and RHS of the above equations we get,	
	DR+BP+AP+CR = DS+BQ+AS+CQ	1
	By rearranging them we get,	
	(DR+CR) + (BP+AP) = (CQ+BQ) + (DS+AS)	
	By simplifying,	1

	AD+BC= CD+AB	
30	$LHS = \frac{\cot\cot A - \cos\cos A}{\cot\cot A + \cos\cos A} = \frac{\frac{\cos\cos A}{\sin\sin A} - \cos\cos A}{\frac{\cos\cos A}{\sin\sin A} + \cos\cos A}$ $= \frac{\frac{\cos\cos A\left(\frac{1}{\sin\sin A} - 1\right)}{\cos\cos A\left(\frac{1}{\sin\sin A} + 1\right)}}{\frac{1}{\sin\sin A} + 1}$ $= \frac{\left(\frac{1}{\sin\sin A} - 1\right)}{\left(\frac{1}{\sin\sin A} + 1\right)}$	1
	$= \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$ OR $LHS = \sqrt{\frac{1 + \sin \sin A}{1 - \sin \sin A}} = \sqrt{\frac{1 + \sin \sin A}{1 - \sin \sin A}} \times \sqrt{\frac{1 + \sin \sin A}{1 + \sin \sin A}}$	1
	$=\sqrt{\frac{(1+\sin\sin A)^2}{1-\sin^2 A}}$	1
	$= \frac{1 + \sin \sin A}{\cos \cos A}$ $= \frac{1}{\cos A} + \frac{\sin A}{\cos A}$ $A + \tan \tan A = RHS$	1
		1
		1
31	For using correct formula of area of sector For substituting correct values	1 1 1
	For finding correct area of sector i.e. 231 cm ² OR For correct figure	1 2
	For finding the length of the chord (2x4=8 cm)	2
	Section-D	
32	Formation of correct equations using given conditions For correct solution of equations using any method There are two such numbers: 42 and 24	2 2 1
	OR $2x + 3y = 17$ (1) $x - 4y = -19$ (2)	
	Multiplying equation(2) by 2 and subtracting from equation(1) 2x + 3y = 17 2x - 8y = -38	1
	$11y = 55$ $\Rightarrow y = 5,$ Putting the value of v in equation (1) we get $2y + 2y = 17$	1
	Putting the value of y in equation (1) we get, $2x + 3 \times 5 = 17$ $\Rightarrow 2x = 17 - 15$	

	$\Rightarrow 2x = 2 \Rightarrow x = 1$	1
	Now putting the values of x and y in equation $y = mx + 3$, we get $m = 2$	1
		<u> </u>
33	For first term $a_1 = S_1 = 3$	1
	For $S_2 = 4$	
	2	l
	For second term = $a_2 = S_2 - S_1 = 4 - 3 = 1$	1
	For 10^{th} term, $a_{10} = S_{10} - S_9 = (-60) - (-45) = -15$	1
	For n th term, $a_n = S_n - S_{n-1} = (4n - n^2) - (6n - n^2 - 5) = 5 - 2n$	
34	For correct statement	1
	Given, to prove, construction, figure	2
	For correct proof	2
35	For correct figure	1
	For correct values of trigonometric ratios	1
	For finding correct height of the tower, $h = 20(\sqrt{3} - 1) m$	3
	OR	
	Let AB = height of the building	
	Given: $\angle ADF = 30^{\circ}$, $\angle AEF = 60^{\circ}$	
	$AF = AB - FB \qquad [\because CD = BF]$	
	= 30 m - 1.5 m = 28.5 m	
	In ΔAFE,	
	$\frac{AF}{EF} = \tan 60^{\circ}$	1
	EF = tall 60	1
	$\Rightarrow \frac{28.5}{\text{EF}} = \sqrt{3}$	
	$\Rightarrow EF = \frac{28.5}{\sqrt{2}} \text{ m}$	1
	³⁰ 30°	1
	In ΔAFD,	
	$\frac{AF}{DF} = \tan 30^{\circ}$	
	2.	
	$\Rightarrow \frac{28.5}{DF} = \frac{1}{\sqrt{3}}$	
	,	1
	$\Rightarrow DF = 28.5\sqrt{3} m$	
	The distance walked by the boy towards building	
	DE = DF - EF	1
	$= 28.5\sqrt{3} - \frac{28.5}{\sqrt{3}} = \frac{28.5 \times 3 - 28.5}{\sqrt{3}} = \frac{28.5(3-1)}{\sqrt{3}}$	
	$=\frac{28.5\times2}{\sqrt{3}}\times\frac{\sqrt{3}}{\sqrt{3}}=\frac{57\sqrt{3}}{3}=19\sqrt{3} \text{ m}$	1
	$\sqrt{3}$ $\sqrt{3}$ 3	
		1
	Section-E	1
36	Case-study-1	1+1+2
	a) $k = 48$	
	b) 2 seconds	
	c) $p(t) = t^2 + t - 2$	
		-

	OR $p(x) = x^{2} - (sum of zeroes)x + product of zeroes$ $\Rightarrow p(x) = x^{2} - (-3)x + 2$ $\Rightarrow p(x) = x^{2} + 3x + 2$	
37	Case-study-2 a) The point on x-axis which is equidistant from I and E is (1/2,0) b) The point on y-axis which is equidistant from B and C is (0,1) c) Coordinates of player Q are (0, 1) OR Coordinates of the position of player P are (2, 3/2)	1+1+2
38	Case-study-3 a) Since number of rows were equal to the number of seats in each row in original arrangement, total seats are x^2 . In new arrangement row are $2x$ and seats in each row are -10 . Total seats are 300 more than previous seats so total number of seats are $(2x)(x-10)$ thus, $(2x)(x-10) = x^2 + 300$ $\Rightarrow x^2 - 20x - 300 = 0$ b) We have $x^2 - 20x - 300 = 0$ $\Rightarrow x^2 - 30x + 10x - 300 = 0$ $\Rightarrow x(x-30) + 10(x-30) = 0$ $\Rightarrow (x-30)(x-10) = 0$ $\Rightarrow x = -10$, 30 Number of rows in the original arrangement $= 30$ c) Number of seats in original arrangement, $= x^2 = 30^2 = 900$ OR Total seats in rearrangement $= 30$	1+1+2