MODEL SSLC EXAMINATION – 2017

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KEY FOR MATHEMATICS

SECTION – I

15 x 1 = 15 marks

Q. No	Key	Answer	Q. No	Key	Answer
1.	(1)	{p, q}	9.	(4)	40°
2.	(2)	an A.P.			
3.	(2)	$\frac{1}{3}$	10.	(4)	24 cm
4.	(3)	$x + 1$	11.	(3)	$\sin\theta$
5.	(3)	$-\frac{8}{5} < k < \frac{8}{5}$	12.	(4)	0
6.	(1)	–1, 0, 0, –1	13.	(4)	3π cm^2
7.	(1)	6	14.	(2)	128
8.	(4)	8	15.	(2)	$0 \le p \le 1$

SECTION-II

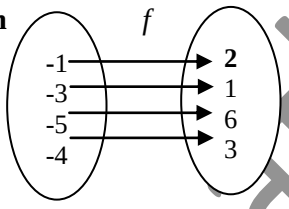
10 x 2 = 20 marks

16. $f = \{(-1, 2), (-3, 1), (-5, 6), (-4, 3)\}$

(i) **Table** **- 1 mark**

f	–1	– 3	–5	–4
f (x)	2	1	6	3

(ii) **Arrow diagram** **- 1 mark**



17. $2x, 5x-7, 7x$ are in A.P

$x = 14$ **- 1 mark**

The required numbers are 28, 70, 98 **- 1 mark**

18. $p(x) = (x - \frac{1}{4})(x+1)$ (or) $x^2 - \left(\frac{1}{4} - 1\right)x + \left(\frac{1}{4}\right)(-1)$ **- 1 mark**

$p(x) = x^2 + \frac{3}{4}x - 1$ **-1 mark**

19. $\alpha + \beta = 14$, $\alpha\beta = 46$ **- 1 mark**

The required equation is $x^2 - 14x + 46 = 0$ **- 1 mark**

20. $a_{11} = \frac{1}{2}$, $a_{12} = \frac{9}{2}$, $a_{21} = 0$

$a_{22} = 2$, $a_{31} = \frac{1}{2}$, $a_{32} = \frac{1}{2}$ **- 1 mark**

$A = \begin{bmatrix} \frac{1}{2} & \frac{9}{2} \\ 0 & 2 \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$ **- 1 mark**

21. $C = 2A + B$

$C = 2\begin{pmatrix} 3 & 2 \\ 5 & 1 \end{pmatrix} + \begin{pmatrix} 8 & -1 \\ 4 & 3 \end{pmatrix}$ **- 1 mark**

$C = \begin{pmatrix} 14 & 3 \\ 14 & 5 \end{pmatrix}$ **- 1 mark**

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22. Let A (a, b+c), B (b, c + a) and C (c, a + b) be the given points.

The area of $\Delta ABC = \frac{1}{2}\begin{Bmatrix} a & b & c & a \\ b+c & c+a & a+b & b+c \end{Bmatrix}$

$= \frac{1}{2}$ { [a (c+a) +b (a+b) + c (b+c)] - [(b+c) b+ (c+a) c+(a+b) c]} = 0 **- 1 mark**

The given three points A, B, C are collinear.

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23. AB + CD = AD+BC **- 1 mark**

AD = 6.5 cm **- 1 mark**

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24. $\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta} = \sqrt{(1+\tan^2\theta)+(1+\cot^2\theta)}$

$= \sqrt{\tan^2\theta + \cot^2\theta + 2}$ **- 1 mark**

$= \sqrt{\tan^2\theta + \cot^2\theta + 2\tan\theta\cot\theta}$

$= \sqrt{(\tan\theta + \cot\theta)^2}$

$= (\tan\theta + \cot\theta)$ **- 1 mark**

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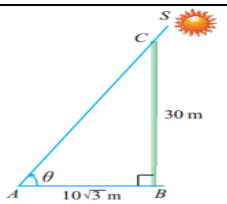
25. $\tan\theta = \sqrt{3}$ **- 1 mark**

$\theta = 60°$



- 1 mark

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26. Given that $r = 20$ cm and $l = 29$ cm
$h = 21$ cm

The volume of the cone $= \frac{1}{3}\pi r^2 h$ **-1 mark**

$= 8800\ cm^2$ **-1 mark**

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27. Given that r = h

$V_1 : V_2 : V_3 = \frac{1}{3}\pi r^2 h : \frac{2}{3}\pi r^3 = \pi r^2 h$ **- 1 mark**

$= \frac{1}{3}\pi r^3 : \frac{2}{3}\pi r^3 : \pi r^3$

$V_1 : V_2 : V_3 = \frac{1}{3} : \frac{2}{3} : 1$

The required ratio is 1: 2 : 3 **- 1 mark**

28. SD of the first 10 natural numbers $\sigma = \sqrt{\frac{n^2-1}{12}}$ **- 1 mark**

$\sigma = \sqrt{\frac{100-1}{2}}$

$\sigma = 2.87$ **- 1 mark**

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29. Let P (A) = p,

P (B) = $\frac{3}{2}$ p, P (c) = $\frac{3}{4}$ p

P (A) + P(B) + P(C) = 1 **- 1 mark**

$p + \frac{3}{2}p + \frac{3}{4}p = 1$

$p = \frac{4}{13}$ (or)

P (A) = $\frac{4}{13}$ **- 1 mark**

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30. (a) A = {–3, –2, –1, 0 ,1, 2, 3}

B = {1, 2, 3, 4}

BUC = {1, 2, 3, 4, –5, –3, –1, 0} **-1 mark**

A ∩ (B U C) = {–3, – 1, 0, 1, 2, 3} **-1 mark**

(OR)

(b) Given straight lines are

$\frac{y}{2} = x - p$, $ax + 5 = 3y$

$2x - y - p = 0$, $ax - 3y + 5 = 0$

$m_1 = 2$, $m_2 = \frac{a}{3}$

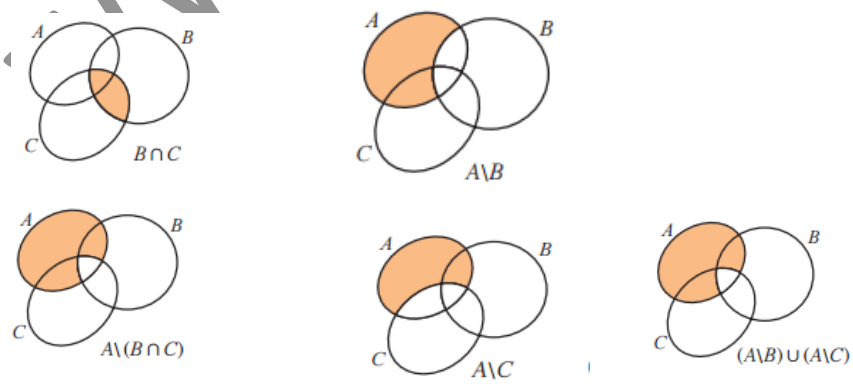
Since given lines are parallel, $m_1 = m_2$ **- 1 mark**

$2 = \frac{a}{3}$

a = 6 **- 1 mark**

SECTION-III

31.



(Each diagram carries 1 mark) **- 5 marks**

32. (i) $f(5) + f(6) = 7+9 = 16$ **- 1 mark**

(ii) $f(1) - f(-3) = 3-35 = -32$ **- 1 mark**

(iii) $f(-2) - f(4) = 15-10 = 5$ **- 1 mark**

(iv) $\frac{f(3)+f(-1)}{2f(6)-f(1)} = \frac{7+3}{2(9)-3} = \frac{10}{15} = \frac{2}{3}$ **-2marks**

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33. Let the first three terms of the G.P be a, ar, ar^2

Given that $a(1 + r + r^2) = 13$

$a^2 (1+r^2+r^4) = 91$

$\frac{1-r+r^2}{1+r+r^2} = \frac{7}{13}$ **- 1 mark**

$3r^2 - 10r + 3 = 0$ **- 1 mark**

$(r - 3)(3r - 1) = 0$

$r = 3$ (or) $\frac{1}{3}$ **- 1 mark**

When r = 3, the three terms are 1, 3, 9 **- 1 mark**

When r = $\frac{1}{3}$, the three terms are 9, 3, 1 **- 1 mark**

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34. $16^3+17^3+18^3+\ldots\ldots+30^3 = \sum_1^{30} k^3 - \sum_1^{15} k^3$ **-1 mark**

$\sum_{k=1}^{n} k^3 = \left(\frac{n(n+1)}{2}\right)^2$ **-1 mark**

$= \left[\frac{30(30+1)}{2}\right]^2 - \left[\frac{15(15+1)}{2}\right]^2$ **-1 mark**

$= 216225 - 14400$ **-1 mark**

$= 201825\ cm^3$ **-1 mark**

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35. $\frac{x}{x+1} + \frac{x+1}{x} = \frac{34}{15}$

$\frac{x^2+x^2+2x+1}{x^2+x} = \frac{34}{15}$ **-1 mark**

$(2x+5)(2x-3) = 0$ **-2marks**

$x = \frac{-5}{2}$ (or) $\frac{3}{2}$

Solution set is $\left\{\frac{-5}{2}, \frac{3}{2}\right\}$ **-2marks**

36.

$4x^2 - 3x + 2$ **-1 mark**

$4x^2$	$16x^4 - 24x^3 + 25x^2 - nx + m$
	$16x^4$
$8x^2 - 3x$	$-24x^3 + 25x^2$
	$-24x^3 + 9x^2$
$8x^2 - 6x + 2$	$16x^2 - nx + m$
	$16x^2 - 12x + 4$
	0

-2marks

-1 mark

Since the given polynomial is a perfect square. We must have n = 12 and m = 4 **-1 mark**

37. $\alpha+\beta=\frac{5}{3},\quad \alpha\beta=\frac{2}{3}$ **- 1mark**

(i) $\frac{\alpha}{\beta}+\frac{\beta}{\alpha} = \frac{13}{6}$ **-1 mark**

(ii) $\alpha-\beta = \pm\frac{1}{3}$ **-1 mark**

(iii) $\frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha} = \frac{35}{18}$ **-2marks**

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38. A+ B = $\begin{pmatrix}0 & 2\\ 1 & 1\end{pmatrix}$

$(A+B)^2$ = $\begin{pmatrix}2 & 2\\ 1 & 3\end{pmatrix}$ **-1 mark**

A^2 = $\begin{pmatrix}9 & -16\\ -8 & 17\end{pmatrix}$ **-1 mark**

AB = $\begin{pmatrix}13 & 14\\ 11 & -18\end{pmatrix}$ **-1 mark**

2AB = $\begin{pmatrix}19 & 18\\ -9 & 22\end{pmatrix}$ **-1 mark**

$A^2 + 2AB + B^2 =$ $\begin{pmatrix}2 & -6\\ 5 & 3\end{pmatrix}$ **-1 mark**

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39. Let the given points be A(–4, –2) , B(5, –5), C(0, 7) and D(–4, 5)

Area of the quadrilateral ABCD

$= \frac{1}{2}\begin{Bmatrix}-4 & -5 & 0 & -4 & -4\\ -2 & -5 & 7 & 5 & -2\end{Bmatrix}$ **-2marks**

$= \frac{1}{2}\left[(20+35+0+8)-(-10+0-28-20)\right]$ **-2marks**

$= \frac{1}{2}(63+58)$

= 60.5 sq.units. **-1 mark**

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40. Mid point D= D (8,7) **-1 mark**

Equation of the median AD is $\frac{y-4}{7-4}=\frac{x+4}{8+4}$ **-2marks**

$x - 4y + 2\ 0 = 0$ **-2marks**

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41. Given that $\tan^2\alpha = \cos^2\beta - \sin^2\beta$

Adding both sides 1

$1+ \tan^2\alpha = \cos^2\beta + 1 - \sin^2\beta$ **-2marks**

$\sec^2\alpha = 2\cos^2\beta$

$\cos^2\alpha = \frac{1}{2}\sec^2\beta$

$\sin^2\alpha = 1 - \frac{1}{2}\sec^2\beta$

$\cos^2\alpha - \sin^2\alpha = \sec^2\beta - 1$ **-2marks**

c$\cos^2\alpha - \sin^2\alpha = \tan^2\beta$ **-1 mark**

Note: Different method can be adopted

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42. Given that R = 18cm, Let r_1 = 2cm, r_2= 12cm

$\frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3 = \frac{4}{3}\pi R^3$ **-1 mark**

$2^3+12^3+r_3^3 = 18^3$ **-2marks**

$r_3^3 = 16^3$ **-1 mark**

$r_3 = 16$cm **-1mark**

43.

x	d= x-24	d^2
20	-4	16
18	-6	36
32	8	64
24	0	0
26	2	4
	Σd= 20	Σd^2=120

-2 marks

$\bar{x}$ = 24, σ = 4.9 **-1 mark**

CV = $\frac{\sigma}{\bar{x}} \times 100$ **-1 mark**

CV = 20.42 **-1 mark**

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44. n(S) = 36, n(A) = 6

P(A) = $\frac{6}{36}$ **-1 mark**

n(B) = 6, P(B) = $\frac{6}{36}$ **-1 mark**

n(A∩B) = 1, P(A∩B) = $\frac{1}{36}$ **-1 mark**

By addition theorem

P(AUB) = P(A) + P(B) – P(A∩B) **-1 mark**

= $\frac{11}{36}$ **-1 mark**

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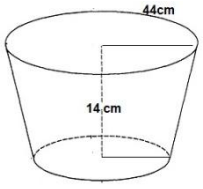
45. (a) Given that



2 π R= 44 cm, 2πr = 8.4π cm

and h = 14cm

R = 7cm, r =4.2cm **-1 mark**

Volume of the frustum = $\frac{1}{3}\pi h (R^2+r^2+Rr)$ **-1 mark**

$= \frac{1}{3} \times \frac{22}{7} \times 14\ (7^2+4.2^2+7\times4.2)$ **-2marks**

$= 1408.57\ cm^3$ **-1 mark**

(OR)

b) **Diagram** **-1 mark**

Statement **-1 mark**

Given, To prove, Construction **-1 mark**

Proof **-2marks**

SECTION – IV

46. (a) Rough diagram **-1 mark**

First Circle **-3marks**
Line Segment OP **-1 mark**
Perpendicular bisector **-1 mark**
Second circle **-2marks**
Two tangents lines **-1 mark**
Measuring the length **-1 mark**

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46. (b) Rough diagram **-1 mark**

Draw a line segment AB **-1mark**
From B draw BX such that $\angle ABX = 50°$ **-1mark**
From A draw AY such that $\angle BAY = 60°$ **-1mark**
Draw perpendicular bisectors of AB and BC **-2marks**
Draw a circumcircle **-2marks**
From C, draw CZ such that $\angle ACZ = 30°$ **-1 mark**
Join 4th side. **-1mark**

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47. (a) $y = 2x^2 + x - 6$

x	–3	–2	–1	0	1	2	3
x^2	9	4	1	0	1	4	9
$2x^2$	18	8	2	0	2	8	18
x	–3	–2	–1	0	1	2	3
-6	–6	–6	–6	–6	–6	–6	–6
Y	9	0	–5	–6	–3	4	15

Plot the points (–3, 9) (–2, 0) (–1, –5) (0, –6) (1, –3) (2, 4) and (3, 15) **-2marks**
Join the points by a smooth curve **-4marks**
Scale and drawing x and y axis **-2marks**
Solution Set {–2, 1.5} **-2marks**

(b) $y \propto x \Rightarrow y = kx \Rightarrow \frac{y}{x} = k$

$y = 2x$

Formation of equation **-1 mark**

Plotting the points and drawing the curve **-5marks**

Drawing x and y axes, scale **-2marks**

Solution Set

$x = 4, y = 8$ **-2marks**

$y = 12, x = 6$

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