SETHU BHASKARA MATRIC. HR. SEC. SCHOOL, PUDUR

HALF YEARLY ANSWER KEY - 2019

STD : XII MATHEMATICS

SECTION - A [PART - I]

Each 1 marks

1) d) $\begin{bmatrix} 5 & -2 \\ 3 & -1 \end{bmatrix}$

2) b) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$

3) d) $\sqrt{5}+2$

4) d) $x+iy$

5) c) 1

6) a) one negative and two imaginary zeros

7) c) $\pi/2 - x$

8) a) $\frac{1}{\sqrt{2}}$

9) c) $(0, 1/8)$

10) c) 2

11) d) $\pi/2$

12) b) 2.5

13) d) ∞

14) b) $(1+xy)e^{xy}$

15) c) 2

16) b) $\frac{2}{9}$

17) a) $\pi/2$

18) a) $y+\sin^{-1}x = c$

19) d) $\cot x$

20) b) $(1, 1)$

SECTION - B [PART - II]

	MARKS
21) $i^{59} = -i$	1
$\frac{1}{i^{59}} = i$	½
$i^{59} + \frac{1}{i^{59}} = -i+i = 0$	½
22) $\alpha+\beta+\gamma = -2$ $\alpha\beta+\beta\gamma+\gamma\alpha = 3$ $\alpha\beta\gamma = -4$	½

	MARKS
$2\alpha+2\beta+2\gamma = -4$ $4[\alpha\beta+\beta\gamma+\gamma\alpha] = 12$ $8\alpha\beta\gamma = -32$	½
$x^3+4x^2+12x+32=0$	1
23) $\operatorname{cosec}^{-1}(-1) = -\operatorname{cosec}^{-1}(1)$	1
$= -\pi/2$	1

MARKS

24) $V(-1,-2)$, $4a = 4$ — $\frac{1}{2}$

Parabola open upward

$$(x+1)^2 = 4(y+2)$$ — $1\frac{1}{2}$

25) $\vec{a} = 2\hat{i} - \hat{j} + 3\hat{k}$

$\vec{b} = 3\hat{i} + 2\hat{j} + \hat{k}$ — $\frac{1}{2}$

$\vec{c} = \hat{i} + m\hat{j} + 4\hat{k}$

$[\vec{a}\ \vec{b}\ \vec{c}] = 0$

$$\begin{vmatrix} 2 & -1 & 3 \\ 3 & 2 & 1 \\ 1 & m & 4 \end{vmatrix} = 0$$ — $\frac{1}{2}$

$m = -3$ — 1

28) $y = \dfrac{(1-2x)^3}{3-4x}$

$$\frac{dy}{dx} = \frac{-6(3-4x)(1-2x)^2 + 4(1-2x)^3}{(3-4x)^2}$$ — 1

$$dy = \frac{(16x - 14)(1-2x)^2}{(3-4x)^2}\,dx$$ — 1

30) $f(x) = e^{-x}$ $\quad f(0) = 1$ — $\frac{1}{2}$

$f'(x) = -e^{-x}$ $\quad f'(0) = -1$

$f''(x) = e^{-x}$ $\quad f''(0) = 1$ — $\frac{1}{2}$

MARKS

26) $\vec{a_2}$, $\vec{a_1}$, $\vec{u}$, $\vec{v}$ — $\frac{1}{2}$

$$[\vec{a_2} - \vec{a_1}\ \ \vec{u}\ \ \vec{v}] = \begin{vmatrix} -2 & -4 & -6 \\ 2 & 3 & 4 \\ 1 & 2 & 3 \end{vmatrix}$$ — 1

$= 0$

$\therefore$ Given lines are not parallel — $\frac{1}{2}$

27) y is continuous on $[-2,2]$

y is differentiable on $(-2,2)$

$f(-2) = f(2) = 5$

$f'(c) = 0$ $\quad 2c = 0$

$c = 0$

$\therefore x =$

29) $I = \displaystyle\int_{-\pi/2}^{\pi/2} x\cos x\,dx$ — $\frac{1}{2}$

$f(-x) = -f(x)$ — 1

$I = 0$ — $\frac{1}{2}$

The maclaurin series

$$e^{-x} = 1 - \frac{x}{1!} + \frac{x^2}{2!} - \dots$$ — 1

PART – III

31) $|F(\alpha)| = 1$ — 1

$$F(-\alpha) = \begin{bmatrix} \cos\alpha & 0 & -\sin\alpha \\ 0 & 1 & 0 \\ \sin\alpha & 0 & \cos\alpha \end{bmatrix}$$ — 1

$$[F(\alpha)]^{-1} = F(-\alpha)$$ — 1

32) $3x - ix - 2y + iy + 2i + 5$ — $\frac{1}{2}$

$= 2x - y + 2yi + 3 + 2i$

$3x - 2y + 5 = 2x - y + 3$ — (I) — $\frac{1}{2}$

$x - y = -2$ — (II)

$x = -2$, $\quad y = 0$ — 2

MARKS | MARKS

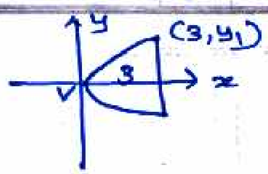
33) $\alpha = 3+2i$ — ½

$\beta = 3-2i$ — ½

$\alpha+\beta = 6, \ \alpha\beta = 13$ — 1

The minimum degree equation $x^2-6x+13=0$ — 1

35)



— ½

$y^2 = 8x$ at $(3, y_1)$ — 1½

$y_1 = 2\sqrt{6}$ — ½

width $= 2y_1 = 4\sqrt{6}$ m — ½

37) $\lim\limits_{x\to 0^+}\left(\frac{1}{x} - \frac{1}{e^x-1}\right)$

$= \infty - \infty$ — ½

$\lim\limits_{x\to 0^+}\left[\frac{e^x-1-x}{x(e^x-1)}\right] = \frac{0}{0}$ — ½

$\lim\limits_{x\to 0^+} \frac{e^x-1}{xe^x+e^x-1} = \frac{0}{0}$ — 1

$\lim\limits_{x\to 0^+} \frac{e^x}{xe^x+e^x+e^x} = \frac{1}{2}$ — 1

39) $y e^{-3x} = C\cos 2x + D\cos 2x$ — ½

$e^{-3x}[-3y+y'] = -2C\sin 2x + 2D\sin 2x$ — 1

$e^{-3x}[y''-6y'+9y] = -4ye^{-3x}$ — 1

$y''-6y'+13y=0$ — ½

34) $\tan^{-1}\left[\dfrac{\frac{x-1}{x-2}+\frac{x+1}{x+2}}{1-\left(\frac{x-1}{x-2}\right)\left(\frac{x+1}{x+2}\right)}\right] = \pi/4$ — 1

$\frac{2x^2-4}{-3} = 1$ — 1

$x^2 = \frac{1}{2}, \quad x = \pm\frac{1}{\sqrt{2}}$ — 1

36) LHS $= \{(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c})\}\cdot(\vec{c}\times\vec{a})$ — 1

$= \{[\vec{a}\ \vec{b}\ \vec{c}]\vec{b} - [\vec{a}\ \vec{b}\ \vec{b}]\vec{c}\}\cdot(\vec{c}\times\vec{a})$ — ½

$= [\vec{a}\ \vec{b}\ \vec{c}]\{\vec{b}\cdot(\vec{c}\times\vec{a})\}$ — 1

$= [\vec{a}\ \vec{b}\ \vec{c}]^2$ — ½

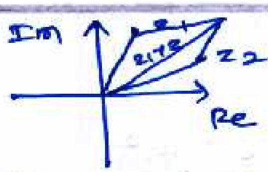
38) $I = \int_{-1}^{1} \log\left(\frac{3-x}{3+x}\right)dx$ — ½

$I = \int_{-1}^{1} \log\left(\frac{3+x}{3-x}\right)dx$ — 1

$2I = \int_{-1}^{1} \log 1\, dx = 0$ — 1

$I = 0$ — ½

40)



— 1

$z_1 = x_1+iy_1, \quad z_2 = x_2+iy_2$ — 1

$z_1+z_2 = (x_1+x_2)+i(y_1+y_2)$ — 1

41) a) $\Delta = -22$ 1

$\Delta x = -44$ 1

$\Delta y = -66$ 1

$\Delta z = -88$ 1

$(x, y, z) = (2, 3, 4)$ 1

(OR)

$\Delta = 6$, $\Delta x = 32$, $\Delta y = -14$ 3

$\Delta z = -12$ 1

$(x, y, z) = \left(\frac{16}{3}, -\frac{7}{3}, -2\right)$ 1

42) a) $z = x + iy$

$\arg\left(\frac{z-1}{z+1}\right) = \frac{\pi}{2}$

$\arg(z-1) - \arg(z+1) = \frac{\pi}{2}$ 1

$\tan^{-1}\left(\frac{y}{x-1}\right) - \tan^{-1}\left(\frac{y}{x+1}\right) = \frac{\pi}{2}$ 1

$\frac{2y}{x^2+y^2-1} = \tan\frac{\pi}{2}$ 2

$x^2 + y^2 = 1$ 1

Another method also applicable

43) a) $FP^2 = e^2 PM^2$

$(x-2)^2 + (y-3)^2 = \frac{1}{4}\frac{(x-7)^2}{1}$ 1

$3x^2 - 2x + 4y^2 - 24y + 3 = 0$ 1

$\frac{(x-\frac{1}{3})^2}{\frac{100}{3}} + \frac{(y-3)^2}{\frac{25}{3}} = 1$ 1

41) b)

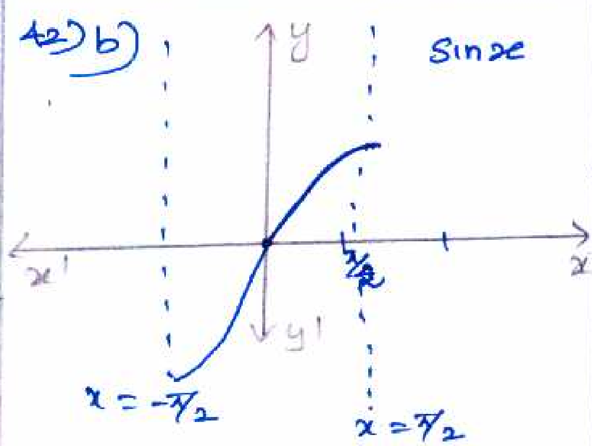
$[A, B] = \begin{bmatrix} 2 & -1 & 1 & 2 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ 2

$R_2 \to R_2 - R_1$, $R_3 \to R_3 - R_1$ 1

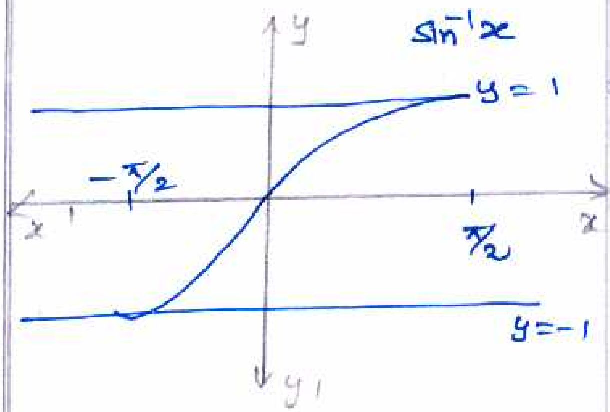
$y = s$, $z = t$, $x = \frac{2+s-t}{2}$ 2

$s, t \in \mathbb{R}$

42) b)



2½



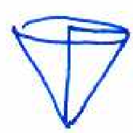
2½

43) a)

$a = \frac{10}{\sqrt{3}}$ $\quad 2a = \frac{20}{\sqrt{3}}$ 1

$b = \frac{5}{\sqrt{3}}$ $\quad 2b = \frac{10}{\sqrt{3}}$ 1

43) a)



½

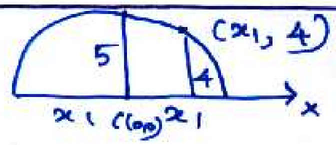
½

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

$V = \frac{1}{3}\pi \frac{25}{144} h^3$

$\frac{dh}{dt} = \frac{9}{10\pi}$ m/min 3

43) b)



½

$$\frac{x^2}{64} + \frac{y^2}{25} = 1$$ 1½

at $(x_1, 4)$

$$\frac{x_1^2}{64} + \frac{16}{25} = 1$$ 1

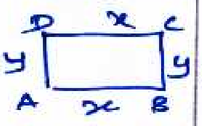
$$x_1^2 = \frac{9}{25} \times 64$$

$$x_1 = \frac{3 \times 8}{5} = \frac{24}{5}$$ 1

$$= 4.8$$

wide $= 2x_1 = 9.6m$ 1

45) (b) $A = xy$



½

$P = 2x + 2y$

$P = 2x + \frac{2A}{x}$ ½

$P'(x) = 2 - \frac{2A}{x^2}$ 1

$P''(x) = \frac{4A}{x^3}$ 1

$P'(x) = 0 \Rightarrow x = \sqrt{A}$ 1

$y = \sqrt{A}$

$x = y$, ABCD is a square. 1

46) a) $u(x, y) = \frac{x^2 + y^2}{\sqrt{x+y}}$

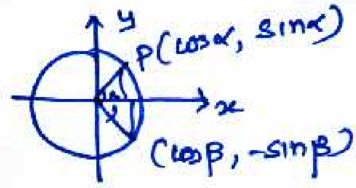
$u(tx, ty) = t^{3/2} u(x, y)$ 2

u is a homogeneous with degree $3/2$ 1

By Euler's therem

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{3}{2} u$$ 2

44) a)



1

$\vec{op} = \cos\alpha\, \hat{i} + \sin\alpha\, \hat{j}$ 1

$\vec{oq} = \cos\beta\, \hat{i} - \sin\beta\, \hat{j}$ 1

$\vec{oq} \times \vec{op} = \sin(\alpha + \beta)\, \hat{k}$ 1

$\vec{oq} \times \vec{op} = [\sin\alpha\cos\beta + \cos\alpha \sin\beta]\hat{k}$ 1

$\Rightarrow \sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$ 1

44) b) V.E

$\vec{r} = (2\hat{i} + 2\hat{j} + \hat{k}) + s(2\hat{i} + 3\hat{j} + 3\hat{k}) + t(3\hat{i} + 2\hat{j} + \hat{k})$

C.E
$$\begin{vmatrix} x-2 & y-2 & z-1 \\ 2 & 3 & 3 \\ 3 & 2 & 1 \end{vmatrix} = 0$$

$3x - 7y + 5z + 3 = 0$

46) (b)

$I.F = e^{\int P dx} = \sin^2 x$ 1½

$y \sin^2 x = \int 3x^2 \operatorname{cosec}^2 x \sin^2 x \, dx + C$ 2½

$y \sin^2 x = x^3 + C$ 1

47) a) $A = ce^{kt}$ 1

YEAR	1960	1990	2050
t	0	30	90
A	1,30,000	1,60,000	?

1

$C = 1,30,000$

$e^{30K} = \frac{16}{13}$ 1

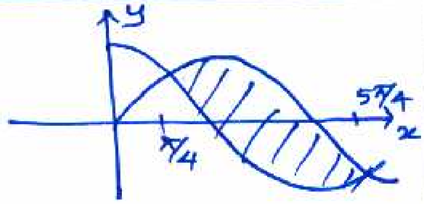
$A = 1,30,000\ e^{90K}$

$= 1,30,000 \left(\frac{16}{13}\right)^3$ 1

$= 1,30,000 \times 1.86$

$= 2,41,800$ (app.) 1

47) b)



1

$$A = \int_{\pi/4}^{5\pi/4} (\sin x - \cos x)\, dx$$ 1

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

$$= \frac{4}{\sqrt{2}} = 2\sqrt{2} \text{ sq.units.}$$ 1

HANDLING TEACHER'S NAME AND Signature

1. Mrs. LAVANYA BALA — Bal
2. Mr. S. GOPI — 14/12/19.
3. Mr. HARIS : 14 Dec' 19
4. Mr. PURUSHOTHAMAN. : B. 14/12
5. Mr. T. VENKATESAN — T. Venkatesan

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