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HALF YEARLY EXAMINATION - 2019

SETHU BHASKARA MHS SCHOOL.

BUSINESS MATHEMATICS

STD: XI

ANSWER KEY

PART - A 20×1 — 20

1. (c) $\frac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$ — 1
2. (b) $|A|^{n-1}$ — 1
3. (a) 2^n — 1
4. (b) 120 — 1
5. (b) latus rectum — 1
6. (c) $a+b=0$ — 1
7. (b) $-\frac{\sqrt{3}}{2}$ — 1
8. (b) $[-1, 1]$ — 1
9. (d) $(0, 1)$ — 1
10. (a) 5 — 1
11. (b) $\frac{1}{5}e^{5x}$ — 1
12. (a) First quadrant — 1
13. (c) Perpectual Annuity — 1
14. (a) added — 1
15. (a) Speed (or) rates — 1
16. (b) 0 — 1
17. (d) -0.97 — 1
18. (c) No Correlation — 1
19. (b) Independant Variable — 1
20. (b) Minimize total Project duration. — 1

21).

$$\begin{vmatrix} x & x+2 \\ x-2 & x \end{vmatrix} = x^2 - (x^2-4) \quad 1$$

$$= 4. \quad 1$$

22)

$$d = \left| \frac{3x_1 - 4y_1 + 12}{\sqrt{9+16}} \right| \quad 1$$

$A + (4, 1)$

$$d = \left| \frac{12 - 4 + 12}{5} \right|$$

$$= \left| \frac{20}{5} \right|$$

$$= 4 \quad 1$$

23)

$(2x+y-7)(x+2y-1) = 0$ — 1

$2x^2 + 5xy + 2y^2 - 9x - 15y + 7 = 0$ — 1

24)

$6x^5 - 4\cos x - 7\sin x - 4e^{-4x}$. — 2

25) Investment - 1

$\frac{20}{100} \times (140 \times 70) = 1400$ — 1

Investement - 2

$\frac{10}{188} \times (148 \times 78) = 1400$ — 1

Both are better investement.

26)

% Increase	x	log x
5	105	2.0112
8	108	2.0334
77	177	2.3026

$\Sigma \log x = 6.3026$, GM = 126.2, 26.2% — 1

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27) $S = \{(G,G),(B,G),(G,B)\}$

$n(S) = 3$ 1

$P(A) = \frac{n(A)}{n(S)} = \frac{1}{3}$ 1

28)

$r(x,y) = \frac{\Sigma xy}{\sqrt{\Sigma x^2}\sqrt{\Sigma y^2}}$ 1

$= \frac{120}{\sqrt{90 \times 640}}$ 1

$= 0.5$

29)

$x - \bar{x} = b_{xy}(y - \bar{y})$ 1

$y - \bar{y} = b_{yx}(x - \bar{x})$. 1

30)

$AC = \frac{10 - 4x^5 + 3x^6}{x}$

$AC = \frac{10}{x} - 4x^4 + 3x^5$. 1

$MC = \frac{dc}{dx}$

$\therefore MC = -20x^4 + 18x^5$. 1

PART – III

31.

$10C_8 \times 10C_5$

$= 10C_2 \times 10C_5$ 2

$= \frac{10 \times 9}{1 \times 2} \times \frac{10 \times 9 \times 8 \times 7 \times 6}{1 \times 2 \times 3 \times 4 \times 5}$

$= 11340$. 1

32) $m = \frac{-3}{4}$, $c = \frac{k}{4}$

$a^2 = 64$ 1

$c^2 = a^2(1 + m^2)$

$\frac{k^2}{16} = 64\left(1 + \frac{9}{16}\right)$ 1

$k = \pm 40$ 1

33)

$\sin^2\frac{\pi}{6} + \cos^2\frac{\pi}{3} - \tan^2\frac{\pi}{4}$

$= \left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^2 - (1)^2$ 2

$= \frac{-1}{2}$. 1

34) $y = x^2 \sin x$

$\frac{dy}{dx} = x^2 \cos x + \sin x(2x)$ 2

$\therefore \frac{dy}{dx} = x(x\cos x + 2\sin x)$. 1

35) $y = \sin^2 x = (\sin x)^2$

$\frac{dy}{dx} = 2\sin x \cos x$ 2

$\therefore \frac{dy}{dx} = \sin 2x$. 1

36)

demand = supply

$100 - 2p = 3p - 50$ 1

$3p + 2p = 100 + 50$

$5p = 150$

$\therefore p = 30$ 1

At $p = 30$, $x = 3(30) - 50$

$= 90 - 50$

$\therefore x = 40$. 1

37.

$a = 5000$

$n = 4$

$i = 10\% = 0.1$

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$A = \frac{a}{i}\left[(1+i)^n - 1\right]$ 1

$= \frac{5000}{0.1}\left[(1.1)^4 - 1\right]$

$= \frac{5000}{(1/10)}\left[1.4641 - 1\right]$ 1

$= (50000)(0.4641)$

$A = ₹.\ 23,205.$ 1

38) $P(A) = \frac{5}{8}$

$P(B) = \frac{3}{8}$. 1

without replacement

$P(\text{both black}) = \frac{3}{\cancel{8}_4} \times \frac{2}{7} = \frac{3}{21}$. 2

39) $Z = 30x_1 + 40x_2$ 1

$60x_1 + 120x_2 \leq 12000$

$8x_1 + 5x_2 \leq 600$

$3x_1 + 4x_2 \leq 500$

$x_1, x_2 \geq 0$. 2

40)

$3x - 2y = -1 \rightarrow (1)$

$2x - y = 2 \rightarrow (2)$ 1

$(1) \times 1 \quad 3x - 2y = -1$

$(2) \times 2 \quad 4x - 2y = 4$

$-x = -5$.

$x = 5$ sub in (2) 1

$10 - y = 2$

$\therefore y = 8$ 1

$\therefore \bar{x} = 5$ and $\bar{y} = 8$.

PART-IV

41)(a)

$x + y + z = 20$

$2x + y - z = 23$

$3x + y + z = 46$ 1

$\begin{pmatrix} 2 & 1 & 1 \\ 2 & 1 & -1 \\ 3 & 1 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 20 \\ 23 \\ 46 \end{pmatrix}$.

$AX = B$

$|A| = -4 \neq 0$ 1

$\text{adj } A = \begin{pmatrix} 2 & -5 & -1 \\ 0 & -1 & +1 \\ 2 & +4 & 0 \end{pmatrix}^T$

$\therefore \text{adj } A = \begin{pmatrix} 2 & 0 & 2 \\ -5 & -1 & 4 \\ -1 & 1 & 0 \end{pmatrix}$ 1

$X = A^{-1}B$

$X = \frac{1}{-4}\begin{pmatrix} 2 & 0 & 2 \\ -5 & -1 & 4 \\ -1 & 1 & 0 \end{pmatrix}\begin{pmatrix} 20 \\ 23 \\ 46 \end{pmatrix}$. 1

$x = 13,\ y = 2,\ z = 5$ 1

41)(b)

$a = 4, b = 9, h = 10$ 1

$h^2 - ab = 0$, lns are llle. 1

$4x^2 - 12xy + 9y^2 = (2x - 3y)^2$ 1

$2x - 3y + \ell = 0$

$2x - 3y + m = 0$

$2x - 3y + 1 = 0$

$2x - 3y + 8 = 0$. 2

42)(a)

$({}^4C_2 \times {}^6C_3) + ({}^4C_3 \times {}^6C_2) + ({}^4C_4 \times {}^6C_1) = 186$ 2½

(b)

${}^6C_5 + ({}^4C_1 \times {}^6C_4) + ({}^4C_2 \times {}^6C_3) = 120$ 2½

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42)(b)

$A+B=45$

$A=B=22\frac{1}{2}^\circ$ ½

$\tan(A+B)=\tan 45$

$\frac{\tan A+\tan B}{1-\tan A\tan B}=1$ 1½

$\tan A+\tan B=1-\tan A\tan B$

$\tan A+\tan B+\tan A\tan B=1$

$(1+\tan A)+\tan B(1+\tan A)=2$

$\therefore (1+\tan A)(1+\tan B)=2$ 2

Deduction:

$(1+\tan 22\frac{1}{2})^2=2$

$\therefore \tan 22\frac{1}{2}=\sqrt{2}-1$ 1

43)(a)

$y=\begin{pmatrix}2&1&-1\\0&2&1\\5&p&q\end{pmatrix}\rightarrow ①$ 1

$|x|=-1$

$x^{-1}=\frac{1}{|x|}(\text{adj } x)$

$x^{-1}=\begin{pmatrix}2&1&-1\\0&2&1\\5&2&-3\end{pmatrix}\rightarrow ②$ 2

$\therefore p=2$ and $q=-3$. 2

43)(b)

$\log y=\frac{1}{2}\left[\log(x+2)+\log(x^2-8)-\log(4x^2-6x-7)\right]$ 1

$\frac{1}{y}\frac{dy}{dx}=\frac{1}{2}\left[\frac{1}{x+2}+\frac{2x}{x^2-8}-\frac{8x-6}{4x^2-6x-7}\right]$ 2

$\therefore \frac{dy}{dx}=\frac{y}{2}\left[\frac{1}{x+2}+\frac{2x}{x^2-8}-\frac{8x-6}{4x^2-6x-7}\right]$ 2

44)(a) $R=(550-3x-6x^2)x$ 1

$MR=550-6x-18x^2\rightarrow ①$

$p=550-3x-6x^2$ 1

$\frac{dp}{dx}=-3-12x$

$\eta_d=\frac{-p}{x}\cdot\frac{dx}{dp}$ 1½

$\eta_d=\frac{+p}{x}\cdot\left(\frac{-1}{3+12x}\right)$ 1

$p\left[1-\frac{1}{\eta_d}\right]=p\left[1-\frac{x(3+12x)}{p}\right]$

$=p\left[\frac{p-x(3+12x)}{p}\right]$

$=550-3x-6x^2-3x-12x^2$

$\therefore p\left(1-\frac{1}{\eta_d}\right)=550-6x-18x^2\rightarrow ②$ 1

Hence,

$MR=p\left(1-\frac{1}{\eta_d}\right)$. 1

44)(b)

$P(E_1)=\frac{20}{100}=\frac{1}{5}$	$P(A/E_1)=\frac{7}{100}$
$P(E_2)=\frac{30}{100}=\frac{3}{10}$	$P(A/E_2)=\frac{3}{100}$
$P(E_3)=\frac{50}{100}=\frac{1}{2}$	$P(A/E_3)=\frac{5}{100}$ 2

$P(E_3/A)=\frac{P(E_3)P(A/E_3)}{\sum_{i=1}^{3}P(E_i)P(A/E_i)}$ 1

$=\frac{\frac{1}{2}\times\frac{5}{100}}{(\frac{1}{5}\times\frac{7}{100})+(\frac{3}{10}\times\frac{3}{100})+(\frac{1}{2}\times\frac{5}{100})}$ 1

$\therefore P(E_3/A)=0.5208$. 1

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45) (a)

Income from 7% Stock.

$= 9000 \times \frac{7}{100}$

$= 630$, Sale = 7200 — 2

Income from 15% Stock

$= 7200 \times \frac{15}{120}$

$= 900$ — 2

Change in income = 900 − 630

= 270. — 1

45) (b)

R = 46000

C_1 = 108% of 2.5 = 0.27 — 1

C_3 = 45.

$q_0 = \sqrt{\frac{2C_3R}{C_1}} = 4000$ — 1

$n_0 = \frac{R}{q_0} = 12$ — 1

$t_0 = \frac{q_0}{R} = 0.083$ yr — 1

At EOQ,

Carrying cost $= \frac{q_0}{2} \times C_1 = 540$

Ordering cost $= \frac{R}{q_0} \times C_3 = 540$. — 1

46) (a)

$\Sigma x = 338$ | $\bar{x} = 48.29$

$\Sigma y = 361$ | $\bar{y} = 51.57$

$\Sigma dx = 2$ | $\Sigma dy = 11$ | $\Sigma dxdy = 732$ — 2

$\Sigma dx^2 = 774$ | $\Sigma dy^2 = 117$

Regression eqn of y on x

$y - \bar{y} = byx(x - \bar{x})$

$byx = 0.942$ — 1

* Any Method

$y = 0.942x + 6.09$ — 1

At $x = 30$, $y = 34.35$. — 1

46) (b).

(0, 40), (10, 0)

(0, 30), (45, 0) — 2

Graph: — 1

Corner points	$z = 5x_1 + 4x_2$
(45, 0)	225
(3, 28)	127
(0, 40)	160.

— 1

Min z = 127, At (3, 28)

Soln: $x_1 = 3$, $x_2 = 28$. — 1

47) (a)

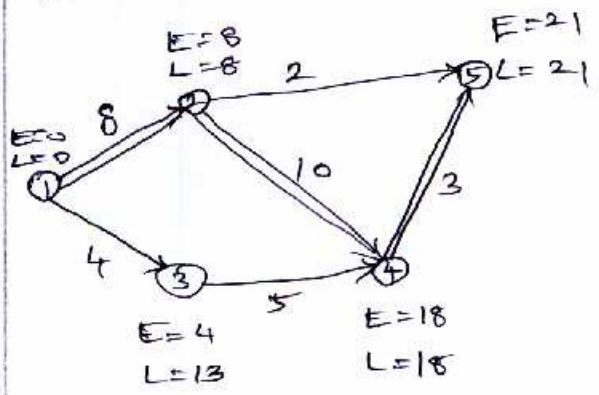
$\frac{2x+1}{(x-1)(x^2+1)} = \frac{A}{x-1} + \frac{Bx+C}{x^2+1}$. — 1

$2x + 1 = A(x^2+1) + (Bx+C)(x-1)$ — ½

$A = \frac{3}{2}$, $B = \frac{-3}{2}$, $C = \frac{1}{2}$ — 3

$\frac{2x+1}{(x-1)(x^2+1)} = \frac{3}{2(x-1)} - \frac{(3x-1)}{2(x^2+1)}$. — ½

47) (b)



— 2

EST: 0 0 8 8 4 18

EFT: 8 # 18 10 9 21

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LST : 0 9 8 19 13 18

LFS : 8 13 18 21 18 21 2

Critical Path : 1-2-4-5 ½

Project Completion time = 21 days. ½

HANDLING TEACHERS :

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28/12/24