SETHU BHASKARA MAT. HR. SEC. SCHOOL

QUARTERLY EXAM- ANS KEY

XII BUSINESS MATHS

part - I

I. choose the correct answer

1. b) n
2. a) non-singular matrix
3. a) 0
4. b) $2\sqrt{e^x}+c$
5. b) 2
6. b) $\sqrt{\pi}/2$
7. c) 4!
8. a) $P=\int(MR-MC)dx+K$
9. a) $MC-MR=0$
10. a) MR
11. c) 2 Sq. units
12. b) of order 1 and degree 3
13. d) $e^{\int P dy}$
14. b) xe^{2x}
15. a) 1
16. a) $\Delta^{m+n} f(x)$
17. M.A
18. b) $2x+3$
19. a) 3
20. b) one

part - II

II. 2 marks $7 \times 2 = 14$

21. $\begin{vmatrix} 0 & -1 & 5 \\ 2 & 4 & -6 \\ 1 & 1 & 5 \end{vmatrix} = 6 \neq 0$ → (1)

Rank is 3. → (1)

Note: Row-echelon form also can be used

22. $\int (3x+5)^{1/2} dx = \frac{(3x+5)^{3/2}}{3(3/2)} + c$ → (1)

$= \frac{2(3x+5)^{3/2}}{9} + c$ → (1)

23. $\int \frac{x}{x^2+1} dx = \frac{1}{2}\int \frac{2x}{x^2+1} dx$

$= \frac{1}{2}\log|x^2+1| + C$ → (2)

24. $MC = 2+5e^x$

$C = \int(2+5e^x)dx+k = 2x+5e^x+k$ → (1)

When $x=0$, $C=100$ $\therefore k=95$

$\therefore C = 2x+5e^x+95$ → (1)

25. $R = \int(20-5x+3x^2)dx+k$

$R = 20x - \frac{5x^2}{2} + x^3 + k$ → (1)

When $x=0$, $R=0$ $\therefore k=0$

$R = 20x - \frac{5x^2}{2} + x^3$ → (1)

26. $y = mx$

$dy/dx = m$ → (1)

$\Rightarrow y = x\,dy/dx$ → (1)

27. $\sec^2 x \tan y\,dx + \sec^2 y \tan x\,dy = 0$

$\frac{\sec^2 x\,dx}{\tan x} + \frac{\sec^2 y\,dy}{\tan y} = 0$

$\log\tan x + \log\tan y = \log c$ → (1)

$\log \tan x \tan y = \log c$

$\tan x \tan y = c$ → (1)

28.

x	y	Δy	$\Delta^2 y$	$\Delta^3 y$	$\Delta^4 y$	$\Delta^5 y$
0	−1					
		1				
1	0		4			
		5		6		
2	5		10		0	
		15		6		0
3	20		16		0	
		31		6		
4	51		22			
		53				
5	104					

↓ ① ①

29. $E(X) = 0\left(\frac{6}{11}\right) + 1\left(\frac{9}{22}\right) + 2\left(\frac{1}{22}\right)$ → ①

$= \frac{11}{22} = \frac{1}{2} = 0.5$ → ①

30. $\Delta f(x) = (x+1)^2 + 3(x+1) - (x^2+3x)$ → ①

$= x^2 + 2x + 1 + 3x + 3 - x^2 - 3x$

$= 2x + 4$ → ①

Part III

III 3 marks $7 \times 3 = 21$

31. $(A,B) = \begin{bmatrix} 1 & 1 & 1 & 9 \\ 2 & 5 & 7 & 52 \\ 2 & -1 & -1 & 0 \end{bmatrix}$

$(A,B) \sim \begin{bmatrix} 1 & 1 & 1 & 9 \\ 0 & 3 & 5 & 34 \\ 0 & 0 & 2 & 16 \end{bmatrix}$ → ②

$x = 3, \quad y = -2, \quad z = 8$ → ①

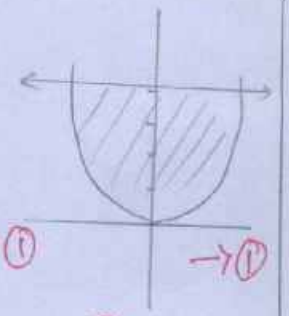
32. $f(x) = e^x + c$

$f(0) = e^0 + c$ → ①

$2 = 1 + c \Rightarrow c = 1$ → ①

$f(x) = e^x + 1$ → ①

33.



$A = 2\int_0^4 y^{1/2}\,dy$

$= \frac{4}{3}\left[y^{3/2}\right]_0^4$ → ① → ①

$A = \frac{32}{3}$ sq units → ①

34. $\frac{dy}{dx} + \frac{2x}{1+x^2}y = \frac{4x^2}{1+x^2}$

I.F $= 1 + x^2$ → ①

$\int (1+x^2)\frac{4x^2}{1+x^2}\,dx = 4x^3/3$ → ①

Solution $y(1+x^2) = \frac{4x^3}{3} + C$ → ①

35. $\Delta^4 y_0 = 0$

$y_4 - 4y_3 + 6y_2 - 4y_1 + y_0 = 0$ → ①

$81 - 4y_3 + 54 - 12 + 1 = 0$ → ①

$y_3 = 31$ → ①

36. $\Delta^4 y_3 = y_7 - 4y_6 + 6y_5 - 4y_4 + y_3$ → ①

$= 17 - 36 + 48 + 24 + 2$ → ①

$= 55$ → ①

37. $E(X+3) = 10$

$\mu = E(X) = 10 - 3 = 7$ → ①

$\sigma^2 = E(X+3)^2 - \left(E(X+3)\right)^2$

$= 116 - 100 = 16$ → ①

$\sigma^2 = 16$

$\mu = 7$ } → ①

38. $F(x) = \begin{cases} 0 & \text{if } x \le 1 \\ k(x-1)^4 & \text{if } 1 < x \le 3 \\ 1 & \text{if } x > 3 \end{cases}$

M. A. → (3)

39. $\int x^3 e^x dx = x^3e^x - 3x^2e^x + 6xe^x - 6e^x + C$ → (2)

$= e^x(x^3 - 3x^2 + 6x - 6) + C$ → (1)

40. $3x + 4y = 780$ → (1)

$2x + 3y = 560$ → (1)

$\Delta = 1, \quad \Delta x = 100, \quad \Delta y = 120$ → (1)

$x = Rs.100, \quad y = Rs.120$ → (1)

part-IV

IV 5 marks $7 \times 5 = 35$

41. a) $T = \begin{bmatrix} 0.65 & 0.35 \\ 0.45 & 0.55 \end{bmatrix}$ → (1)

$[0.15 \quad 0.85] \begin{bmatrix} 0.65 & 0.35 \\ 0.45 & 0.55 \end{bmatrix} = [0.48 \quad 0.52]$ → (1)

$A = 48\%, \quad B = 52\%$ → (1)

$(A \; B)T = (A \quad B)$

$0.65A + 0.45B = A$ → (1)

$A = 56.25\%$

$B = 43.75\%$ → (1)

41. b) $\int \frac{3x+2}{(x-2)^2(x-3)} dx = \int \left(\frac{11}{x-3} - \frac{11}{x-2} - \frac{8}{(x-2)^2} \right) dx$ → (1)

$= 11 \log|x-3| - 11 \log|x-2| + \frac{8}{x-2} + c$ → (2)

$= 11 \log \left| \frac{x-3}{x-2} \right| + \frac{8}{x-2} + C$ → (2)

42. a) $I = \int_0^{\pi/2} \frac{\sin^7 x}{\sin^7 x + \cos^7 x} dx$ — (1)

$I = \int_0^{\pi/2} \frac{\cos^7 x}{\cos^7 x + \sin^7 x} dx$ — (2) → (3)

(1)+(2) $\Rightarrow 2I = \int_0^{\pi/2} 1 \, dx$ → (1)

$2I = \pi/2$

$I = \pi/4$ → (1)

b) $\eta_d = \frac{p + 2p^2}{100 - p - p^2}$

$-\frac{p}{x} \frac{dx}{dp} = \frac{p + 2p^2}{100 - p - p^2}$ → (1)

$\int \frac{dx}{x} = \int \frac{2p+1}{p^2 + p - 100} dp$

$x = K(p^2 + p - 100)$ → (2)

$x = 70, p = 5 \quad \therefore K = -1$ → (1)

$x = 100 - p - p^2$ → (1)

43. a) $P_d = P_s$

$25 - 3x = 5 + 2x$

$\Rightarrow x_0 = 4, \quad P_0 = 13$ → (1)

$$C.S = \int_0^{x_0} f(x)dx - x_0P_0$$

$$= \int_0^4 (25-3x)dx - (4)(13) \rightarrow (1)$$

$$= 24 \text{ units} \rightarrow (1)$$

$$P.S = x_0P_0 - \int_0^{x_0} g(x)dx$$

$$= 52 - \int_0^4 (5+2x)dx \rightarrow (1)$$

$$= 16 \text{ units} \rightarrow (1)$$

43 b) $\frac{dy}{dq} = \frac{q^2+3y^2}{2qy}$

$y = vq \Rightarrow v = y/q$

$$\int \frac{2v}{1+v^2}dv = \int \frac{dq}{q} \rightarrow (2)$$

$\Rightarrow 1+v^2 = cq$

$\Rightarrow q^2+y^2 = cq^3 \rightarrow (1)$

put $q=1, y=5 \quad \therefore C=26$

$q^2+y^2 = 26q^3 \rightarrow (2)$

44.a) $Q_d = Q_s$

$\Rightarrow (D^2+2D-8)P = -16$

$m^2+2m-8=0$

$m = -4, 2 \rightarrow (2)$

$CF = Ae^{-4t} + Be^{2t} \rightarrow (1)$

$PI = \frac{-16}{-8} = 2 \rightarrow (1)$

$P = Ae^{-4t} + Be^{2t} + 2 \rightarrow (1)$

b) $y = y_0 + \frac{\Delta y_0}{1!}(n) + \frac{n(n-1)}{2!}\Delta^2 y_0 + \cdots \rightarrow (1)$

$n = \frac{32-30}{10} = 0.4 \rightarrow (1)$

$y_0 = 15.9, \Delta y_0 = -1, \Delta^2 y_0 = 0.2, \Delta^3 y_0 = -0.2$ and $\Delta^4 y_0 = 0.2 \rightarrow (2)$

$y = 15.9 - 0.4 - 0.24 - 0.028 - 0.002476$

$y = 15.45 \rightarrow (1)$

45 a)

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

M.A. $\rightarrow (5)$

b) $y = \frac{(x-x_1)(x-x_2)(x-x_3)}{(x_0-x_1)(x_0-x_2)(x_0-x_3)}y_0 + \cdots +$

$\frac{(x-x_0)(x-x_1)(x-x_2)}{(x_3-x_0)(x_3-x_1)(x_3-x_2)}y_3 \rightarrow (2)$

$= \frac{1}{6}(12) - \frac{13}{3} + \frac{5(14)}{3\times 2} + \frac{4\times 16}{12} \rightarrow (2)$

$y = 14.6663 \rightarrow (1)$

46.a)

X=x	1	2	3	4	5	6
p(x)	1/6	1/6	1/6	1/6	1/6	1/6

Mean = E(X)

$= \frac{1+2+3+4+5+6}{6}$

$= 7/2 = 3.5$ → (1)

$E(x^2) = \frac{1+4+9+16+25+36}{6}$

$= \frac{91}{6}$ → (1)

$V(X) = E(x^2) - (E(X))^2$ → (1)

$= \frac{91}{6} - \left(\frac{7}{2}\right)^2$ → (1)

$= \frac{35}{12}$ → (1)

b) $x + y + z = 8500$

$2x + 3y + 6z = 38000$

$x + y - z = 0$ → (1)

$\Delta = -2, \quad \Delta_x = -500$

$\Delta_y = -8000, \quad \Delta_z = -8500$ → (3)

$x = 250, \quad y = 4000, \quad z = 4250$ → (1)

47 a) $\Delta^4 y_0 = 0$

$y_4 - 4y_3 + 6y_2 - 4y_1 + y_0 = 0$ → (1)

$y_4 - 4y_1 = 12$ → (1)

$y_5 - 4y_4 + 6y_3 - 4y_2 + y_1 = 0$ → (1)

$-4y_4 + y_1 = -93$ → (1)

$y_1 = 3, \quad y_4 = 24$ → (1)

b) $(A,B) = \begin{bmatrix} 3 & -1 & \lambda & 1 \\ 2 & 1 & 1 & 2 \\ 1 & 2 & -\lambda & -1 \end{bmatrix}$

$(A,B) \sim \begin{bmatrix} 1 & 2 & -\lambda & -1 \\ 0 & -3 & 2\lambda+1 & 4 \\ 0 & 0 & -2\lambda-7 & -16 \end{bmatrix}$ → (3)

$e(A,B) = 3$

$e(A) = 2$ → (1)

$\Rightarrow -2\lambda - 7 = 0$

$\lambda = -7/2$ → (1)

Handling Teachers Signature

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