

Sethu Bhaskara Matric ha. Sec

Quarterly Exam - 2026

BUSINESS MATHS - ANSWER KEY

XII

- 1) d) n
- 2) b) no solution
- 3) a) if
- 4) a) $2\sqrt{e^x} + c$
- 5) b) 0
- 6) c) $\sqrt{\pi}/2$
- 7) c) $P = \int (MR - MC) dx + K$
- 8) c) Revenue is constant
- 9) b) $(e-1)$ sq. units
- 10) d) $d^2y/dx^2 - y = 0$
- 11) c) $d^2y/dx^2 = 0$
- 12) b) $x = y$
- 13) b) $2x+1$
- 14) a) both equal & unequal
- 15) d) 7
- 16) d) 0
- 17) c) 1
- 18) d) $15/2$
- 19) c) $e^{2x}/11$
- 20) b) 1

Part - II

$$21) \int_0^{\infty} x^2 e^{-2x} dx = \frac{2!}{2^{2+1}} = \frac{1}{4} \quad - (1)$$

$$22) \text{Order} = 2 \quad - (1)$$

$$\text{degree} = 2 \quad - (1)$$

$$23) m^2 - 3m - 4 = 0$$

$$(m-4)(m+1) = 0$$

$$m = 4, -1 \quad - (1)$$

$$y = Ae^{4x} + Be^{-x} \quad - (1)$$

$$24) \Delta^4 U_0 =$$

$$U_4 - 4U_3 + 6U_2 - 4U_1 + U_0 \quad - (1)$$

$$= 29 - 4(28) + 6(21) - 4(10) + 1$$

$$= 0 \quad - (1)$$

25) Discrete a.v
finite outcomes $- (1)$
Continuous a.v
Infinite outcomes $- (1)$

$$26) \Delta e^{ax}$$

$$e^{a(x+h)} - e^{ax} \quad - (1)$$

$$= e^{ax}(e^{ah} - 1) \quad - (1)$$

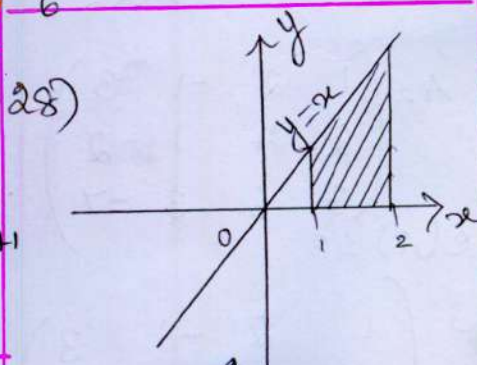
$$27) f(x) = \sin x$$

$$f(-x) = -\sin x$$

$$= -f(x)$$

$$f(x) \text{ is odd} \quad - (1)$$

$$\int_{\pi/3}^{\pi/6} \sin x dx = 0 \quad - (1)$$



$$28) \text{Area} = \int_1^2 y dx$$

$$= \int_1^2 x dx$$

$$= \left[\frac{x^2}{2} \right]_1^2 \quad - (1)$$

$$= \frac{3}{2} \text{ Sq. units} \quad - (1)$$

29)

$$E(X) = \sum x p(x)$$

$$= 0(0.2) + 1(0.1) + 2(0.4) + 3(0.3) - (1)$$

$$= 1.8 - (1)$$

32)

$$\Gamma\left(\frac{7}{2}\right) = \frac{5}{2} \Gamma\left(\frac{5}{2}\right)$$

$$= \frac{5}{2} \times \frac{3}{2} \times \frac{1}{2} \sqrt{\pi} - (1)$$

$$= \frac{15}{8} \sqrt{\pi} - (1)$$

35)

$$\frac{dy}{dx} = \frac{(1+y)}{(1-x)}$$

$$\int \frac{dy}{1+y} = \int \frac{dx}{(1-x)} - (1)$$

$$\log(1+y) = -\log(1-x) + \log k - (1)$$

$$(1+y)(1-x) = k - (1)$$

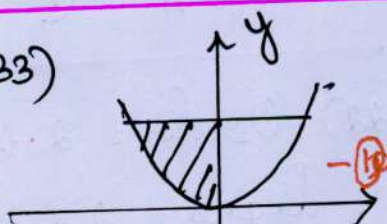
30)

$$A = \begin{pmatrix} 1 & -3 & 4 & 7 \\ 9 & 1 & 2 & 0 \end{pmatrix}$$

$$A \sim \begin{pmatrix} 1 & -3 & 4 & 7 \\ 0 & 28 & -34 & -63 \end{pmatrix} - (1)$$

$$\rho(A) = 2 - (1)$$

33)



$$A = \int_0^4 x dy$$

$$= \int_0^4 \frac{2}{\sqrt{y}} dy - (1)$$

$$= \frac{8}{3} \text{ sq. units} - (1)$$

36)

$$f(x) = \text{formula} - (1)$$

$$f(10) = \frac{1}{6}(12) - \frac{13}{3} + \frac{5(14)}{6} + \frac{4 \times 16}{12} - (1)$$

$$f(10) = 14.6663 - (1)$$

31)

$$A = \begin{pmatrix} 1 & 2 & -1 & 3 \\ 2 & 4 & 1 & -2 \\ 3 & 6 & 3 & -7 \end{pmatrix}$$

$$\rho(A) \leq 3$$

$$\sim \begin{pmatrix} 1 & 2 & -1 & 3 \\ 0 & 0 & 3 & -8 \\ 0 & 0 & 6 & -16 \end{pmatrix} - (1)$$

$$\sim \begin{pmatrix} 1 & 2 & -1 & 3 \\ 0 & 0 & 3 & -8 \\ 0 & 0 & 0 & 0 \end{pmatrix} - (1)$$

$$\rho(A) = 2 - (1)$$

34)

$$C = \int (MC) dx + k$$

$$C = \int_0^{200} \left(\frac{x^2}{200} + 4 \right) dx - (1)$$

$$= \left[\frac{x^3}{600} + 4x \right]_0^{200} - (1)$$

$$= \text{Rs. } 14133.33 - (1)$$

37)

x	2	4	6	8
P(x)	2k	4k	6k	6k

$$\sum P(x) = 1$$

$$2k + 4k + 6k + 6k = 1 - (1)$$

$$18k = 1 - (1)$$

$$k = \frac{1}{18} - (1)$$

$$43) b) \quad \eta_d = \frac{p + 2p^2}{100 - p - p^2} \quad \text{--- (1)}$$

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

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

$$x = K(p^2 + p - 100) \quad \text{--- (1)}$$

$$K = -1$$

$$x = -1(p^2 + p - 100)$$

$$x = 100 - p - p^2 \quad \text{--- (1)}$$

$$44) a) \quad i) \quad 10a^2 + 9a - 1 = 0 \quad \text{--- (1)}$$

$$a = \frac{1}{10}, -1 \quad \text{--- (1)}$$

$$ii) \quad P(X \leq 3) = 3a = \frac{3}{10} \quad \text{--- (1)}$$

$$iii) \quad P(X > 2) = 1 - P(X \leq 2) = \frac{4}{10} \quad \text{--- (1)}$$

$$iv) \quad P(2 < X \leq 5) = \frac{5}{100} \quad \text{--- (1)}$$

44) b)

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 11 \\ 21 \\ 27 \end{bmatrix}$$

$$\Delta = 33 \quad \text{--- (1)}$$

$$\Delta x = 66 \quad \text{--- (1)}$$

$$\Delta y = 99 \quad \text{--- (1)}$$

$$\Delta z = 33 \quad \text{--- (1)}$$

$$(x, y, z) = (2, 3, 1) \quad \text{--- (1)}$$

45) a)

$$1600 = 2x^2 = 2x^2 + 400$$

$$-4x^2 = -1200$$

$$x^2 = 300$$

$$x_0 = 10\sqrt{3} \quad \text{--- (1)}$$

$$p_0 = 1000 \quad \text{--- (1)}$$

$$PS = x_0 p_0 - \int_{10\sqrt{3}}^{x_0} (2x^2 + 400) dx$$

$$= 10000\sqrt{3} - \int_{10\sqrt{3}}^{10000\sqrt{3}} (2x^2 + 400) dx \quad \text{--- (1)}$$

$$= 10000\sqrt{3} - \left[\frac{2x^3}{3} + 400x \right]$$

$$= 11000\sqrt{3} \text{ units} \quad \text{--- (2)}$$

46) b)

$$\frac{3x^2 - 2x + 5}{(x-1)(x^2+5)} = \frac{A}{(x-1)} + \frac{Bx+C}{(x^2+5)} \quad \text{--- (1)}$$

38)

$$Y = 2X + 1$$

$$\begin{aligned} v(Y) &= 4v(X) + 0 \\ &= 4(5) \\ &= 20 \end{aligned}$$

39)

$$\int_0^1 e^{2x} dx$$

$$\begin{aligned} & \left[\frac{e^{2x}}{2} \right]_0^1 \\ &= \frac{1}{2} [e^2 - e^0] \\ &= \frac{1}{2} [e^2 - 1] \end{aligned}$$

40)

$$y' = 2ax + b$$

$$y'' = 2a$$

$$y' = 2xy'' + b$$

$$x^2 y'' - 2xy' + 2y = 0$$

PART - IV

41)

$$T = \begin{pmatrix} 0.8 & 0.2 \\ 0.7 & 0.8 \end{pmatrix}$$

One Period

$$\begin{pmatrix} M & E \\ 76 & 24 \end{pmatrix} \quad \text{--- (1)}$$

$$\begin{pmatrix} 76 & 24 \end{pmatrix} \begin{pmatrix} 0.8 & 0.2 \\ 0.7 & 0.8 \end{pmatrix}$$

$$= (77.6 \quad 22.4) \quad \text{--- (1)}$$

Maths = 78 Students

English = 22 " --- (1)

$$41) b) \Delta^4 y_0 = 0$$

$$(E-1)^4 y_0 = 0 \quad \text{--- (1)}$$

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

$$y_4 - 4y_1 = 12 \quad \text{--- (1)}$$

$$(E-1)^4 y_1 = 0 \quad \text{--- (1)}$$

$$-4y_4 + y_1 = -93 \quad \text{--- (1)}$$

$$y_1 = 3, \quad y_4 = 24$$

$$42) a) m^2 - 3m + 2 = 0$$

$$m = 2, 1$$

$$C.F = Ae^{2x} + Be^x$$

$$P.I = \frac{e^{4x}}{6} \quad \text{--- (1)}$$

$$y = Ae^{2x} + Be^x + \frac{e^{4x}}{6} \quad \text{--- (1)}$$

$$A + B = \frac{1}{6}$$

$$Ae^2 + Be = -\frac{e^4}{6}$$

$$A = \left(\frac{e^2 + e + 1}{6} \right), B = \frac{e^2 + e}{6}$$

$$6y = (e^2 + e)e^x - (e^2 + e + 1)e^{2x} + e^{4x} \quad \text{--- (1)}$$

42) b)

$$\begin{bmatrix} 1 & 1 & 1 \\ 3 & -1 & -1 \\ 1 & 5 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 4 \\ k \end{bmatrix} \quad \text{--- (1)}$$

$$(A, B) = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 3 & -1 & -1 & 4 \\ 1 & 5 & 5 & k \end{bmatrix}$$

$$\sim \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & -4 & -4 & 1 \\ 0 & 4 & 4 & k-1 \end{bmatrix} \quad \text{--- (1)}$$

$$\sim \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & -4 & -4 & 1 \\ 0 & 0 & 0 & k \end{bmatrix} \quad \text{--- (1)}$$

$$k \in \mathbb{R} - \{0\} \quad \text{--- (1)}$$

43) a)

$$I = \int_0^5 \frac{\sqrt{x}}{2\sqrt{x} + \sqrt{7-x}} dx \quad \text{--- (1)}$$

$$I = \int_0^5 \frac{\sqrt{7-x}}{2\sqrt{x} + \sqrt{7-x}} dx \quad \text{--- (1)}$$

$$2I = \int_0^5 dx \quad \text{--- (1)}$$

$$2I = 3 \quad \text{--- (1)}$$

$$I = \frac{3}{2} \quad \text{--- (1)}$$

445) b)

$$E(x) = \int_{-\infty}^{\infty} x f(x) dx$$

$$= \int_0^1 x 4x^3 dx \quad \text{--- ①}$$

$$= 4 \left[\frac{x^5}{5} \right]_0^1 \quad \text{--- } \frac{1}{2}$$

$$E(x) = \frac{4}{5} \quad \text{--- ①}$$

$$E(x^2) = \int_{-\infty}^{\infty} x^2 f(x) dx$$

$$= 4 \left[\frac{x^6}{6} \right]_0^1 \quad \text{--- } \frac{1}{2}$$

$$= \frac{2}{3} \quad \text{--- ①}$$

$$v(x) = \frac{4}{6} - \left(\frac{4}{5} \right)^2$$

$$= \frac{4}{6} - \frac{16}{25}$$

$$= \frac{2}{75} \quad \text{--- ①}$$

446) a)

$$y = vx$$

$$\frac{dy}{dx} = v + x \frac{dv}{dx} \quad \text{--- ①}$$

$$v + x \frac{dv}{dx} = \frac{1-v}{1+v}$$

$$x \frac{dv}{dx} = \frac{1-2v-v^2}{1+v} \quad \text{--- ①}$$

$$\int \frac{1+v}{v^2+2v-1} dv = - \int \frac{dx}{x} \quad \text{--- ①}$$

$$\log(v^2+2v-1) = -2 \log x + \log c \quad \text{--- ①}$$

$$v^2+2v-1 = \frac{c}{x^2}$$

Replace $v = \frac{y}{x}$

$$y^2 + 2xy - x^2 = c \quad \text{--- ①}$$

$$3x^2 - 2x + 5 = A(x^2 + 5) + (Bx + C)(x - 1) \rightarrow 1$$

$$A = 1, B = 2, C = 0$$

$$\frac{1}{(x-1)} + \frac{\frac{1}{2}x}{x^2+5} - \frac{1}{2}$$

$$\log(x^3 + 5x - x^2 - 5) + C$$

(02)

$$\log(x-1)(x^2+5) + C \rightarrow 1$$

47) 6)

$$y \quad \Delta y \quad \Delta^2 y \quad \Delta^3 y \quad \Delta^4 y$$

250	120	-		
370		-20		
	100		-10	
470		-30		0
	76		-10	
540		-20		
	50			
590				

$$n = 1.5 \rightarrow 1$$

$$y = 250 + 180 - 7.5 + 0.625 +$$

$$0.46875$$

$$= 423.59$$

$$= 424 \rightarrow 1$$

$$\text{Difference} = 424 - 370 = 54 \rightarrow 1$$

47) a)

$$13 - 6p + 2 \frac{dp}{dt} + \frac{d^2p}{dt^2} = -3 + 2p \rightarrow 1$$

$$(D^2 + 2D - 8)p = -16 \rightarrow 1$$

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

$$m = -4, m = 2$$

$$C.F. = A e^{-4t} + B e^{2t} \rightarrow 1$$

$$P.I. = 2 \rightarrow 1$$

$$p = A e^{-4t} + B e^{2t} + 2 \rightarrow 1$$

Handling Teachers

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2. R. shal 4/4
(R. SHREBA BERCY)

24/9/20

Zeyo