SETHUBHASKARA MHSS

XII Business Maths

Answer key (HEX)

I. Choose

1. a) 1
2. d) $P(A) = P(A,B) = n$
3. b) $\frac{1}{2}\log|4+x^4| + C$
4. d) 0
5. b) log2 sq. units
6. a) 2
7. c) 10
8. b) 2, 1
9. b) $1/x$
10. a) $A+Be^x$
11. a) $\Delta^{m+n} f(x)$
12. c) 0
13. d) $p(x) = -0.5$
14. c) 4
15. c) De - Moivre
16. b) $\log(1/k)$
17. d) A stratified random sample
18. b) Seasonal variation
19. c) Smallest two costs
20. c) VAM

II. 2 marks

21. $\Delta = 26$, $\Delta x = 26$ → ½

$\Delta y = 104$ → ½, $x = 1$ → ½, $y = 4$ → ½

22. $\int_0^1 (e^{a\log x} + e^{x\log a})\,dx$

$= \int_0^1 (x^a + a^x)\,dx$ → ½

$= \left[\frac{x^{a+1}}{a+1} + \frac{a^x}{\log a}\right]_0^1$ → 1

$= \frac{1}{a+1} + \frac{a-1}{\log a}$ → ½

23. $A = \int_1^3 (-x)\,dy$ → ½

$= \frac{1}{2}\left[4y - \frac{y^2}{2}\right]_1^3$ → 1

= 2 sq units → ½

24. $\Delta^3 f(1) = \Delta^2(\Delta f(1))$

$\Delta^3 f(1) = \Delta^2(f(2) - f(1))$

$\Rightarrow f(4) = f(3) + \Delta f(2) + \Delta^2 f(1) + \Delta^3 f(1)$ → 2

25.

X = x	0	1	2
p(X=x)	¼	½	¼

→ 2

26. $\begin{vmatrix} 4 & 5 & 6 \\ 5 & 6 & k \\ 10 & 11 & 12 \end{vmatrix} = 0$ → 1

$k = 7$ → 1

27. $n = 60, \quad \sigma = 3$

$$S.E = \sqrt{\frac{\sigma^2}{2n}} \rightarrow 1$$

$$= 0.2739 \rightarrow 1$$

28. $a = \frac{\Sigma y}{n} = \frac{36}{4} = 9 \rightarrow \frac{1}{2}$

$b = \frac{\Sigma xy}{\Sigma x^2} = \frac{56}{28} = 2 \rightarrow \frac{1}{2}$

$y = a + bx = 9 + 2x \rightarrow \frac{1}{2}$

29. Assign m diff. jobs to n diff. machines to minimise overall cost. $\rightarrow 2$

30. $P(X=4) = P(X=2)$

$${}^6C_4 p^4 q^2 = {}^6C_2 p^2 q^4 \rightarrow 1$$

$p = q \Rightarrow q = \frac{1}{2} \rightarrow 1$

III 3 marks

31. $$(A,B) = \begin{pmatrix} 1 & -4 & 7 & 14 \\ 3 & 8 & -2 & 13 \\ 7 & -8 & 26 & 5 \end{pmatrix}$$

$$\sim \begin{pmatrix} 1 & -4 & 7 & 14 \\ 0 & 20 & -23 & -29 \\ 0 & 0 & 0 & -64 \end{pmatrix} \rightarrow 2$$

$P(A,B) = 3 \neq P(A,B) = 2 \rightarrow 1$

Inconsistent.

32. $$\int x^3 e^{3x} dx = \frac{e^{3x}}{27}(9x^3 - 9x^2 + 6x - 2) + C \rightarrow 3$$

33. $$\frac{Ey}{Ex} = \frac{x}{x-2}$$

$$\frac{x}{y}\frac{dy}{dx} = \frac{x}{x-2} \rightarrow 1$$

$\Rightarrow y = c(x-2)$, $(4,16)$ $\rightarrow 1$

$\Rightarrow y = 4(x-2) \rightarrow 1$

34. $P = \frac{3x^2}{1+x^3}, \quad Q = \frac{1+x^2}{1+x^3} \rightarrow \frac{1}{2}$ $\rightarrow \frac{1}{2}$

$I.F = 1 + x^3 \rightarrow \frac{1}{2}$

$\int Q(I.F)dx = x + \frac{x^3}{3} \rightarrow \frac{1}{2}$

Ans: $y(1+x^3) = x + \frac{x^3}{3} + C \rightarrow 1$

35. (i) A stratified random sample can be kept small in size without losing its accuracy $\rightarrow 1$

(ii) It is easy administer, if the population under study is sub-divided $\rightarrow 1$

(iii) It reduces the time and expenses in dividing the strata into geographical divisions. $\rightarrow 1$

36. $n=500$, $p=0.09$, $q=0.91$

$p \pm Z_c\sqrt{pq/n}$, $Z_c = 2.58$ → 1

$\Rightarrow 0.09 \pm 0.033$ → 1

$\Rightarrow$ 5.7 % & 12.3% → 1

37. $CLI = \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$ → 1

$= \frac{1000 \times 100}{758}$ (1000 → ½, 758 → ½) $= 131.926$ → 1

38. minimax = min {27, 25, 23, 32}

$= 23$ → 1 E_3 → ½

maximin = max {7, 9, 14, 17}

$= 17$ → 1 E_4 → ½

39. $p(x) = \frac{e^{-1.5}\, 1.5^x}{x!}$ → 1

(i) $p(0) = e^{-1.5} = 0.2231$ → 1

(ii) $p(X>2) = 1 - 0.81 = 0.19$ (0.81 → ½) → ½

40. $n = x$

$y = 1 + 1(x) + \frac{(-2)(x-1)(x)}{2} + \frac{6(x-1)(x-2)(x)}{6}$ → 2

$y = x^3 - 4x^2 + 4x + 1$ → 1

IV 5 marks

41 a) $(0.6 \quad 0.4)\begin{pmatrix} 0.7 & 0.3 \\ 0.3 & 0.7 \end{pmatrix} = (0.54 \quad 0.46)$ → 2

Ans: 54 %, 46% → 1

(ii) 50 % → 2

b) $x_0 = 3$, → ½ $P_0 = 3$ → ½

$C.S = \int_0^{x_0} P_d\, dx - P_0 x_0 = 27$ → 2

$P.S = P_0 x_0 - \int_0^{x_0} P_s\, dx = 9$ → 2

42 a) $\int_0^1 x^2\, dx = \lim_{n\to\infty} \sum_{r=1}^{n} \frac{1}{n} \frac{r^2}{n^2}$ → 2

$= \lim_{n\to\infty} \sum_{r=1}^{n} \frac{n(n+1)(2n+1)}{6n^3}$ → 2

$= \frac{1}{3}$ → 1

b) $y^2 dx + (xy + x^2) dy = 0$

$\frac{dx}{dy} = -\frac{x}{y} - \frac{x^2}{y^2}$ → 1

$x = vy \Rightarrow v = x/y$ → 1

$v + y\frac{dv}{dy} = -v^2 - 2v$

$\frac{dv}{v^2+2v} = -dy/y$ → 1

$xy^2 = C(x+2y)$ → 2

43 a) → 2

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

$E(X) = -1/6$, → 1 $E(x^2) = \frac{91}{6}$, → 1 $Var(X) = \frac{545}{36}$ → 1

b) $m = \pm 2i$ → ½, $CF = A\cos 2x + B\sin 2x$ → 1

$PI = -3$, → ½ $y = CF + PI$

$y = A\cos 2x + B\sin 2x - 3$ → ½

Apply $(0, 0)$, $A = 3$ → ½

Apply $(\pi/4, -5)$, $B = -2$ → ½

$y = 3\cos 2x - 2\sin 2x - 3$ → ½

44 a) $\gamma = \{11, 1, -4, -9\}$ → 1

$D\gamma = \{-10, -15, -20\}$ → 2

$\{10, -5, -10\}$ $\{15, 5, -5\}$ $\{20, 10, 5\}$

$y = -0.432 + 31.68 + 11.88 - 2.112$ → 1

$y = 41.016$ → 1

b) $Z = \frac{X - 12}{3}$ → ½

$P(X > 13) = P(Z > 0.33)$

$= 0.3707$ → ½

(i) 46 → ½

$P(X < 5) = P(Z < -2.33)$

$= 0.0099$ → ½

(ii) 1.24 → ½

$P(9 < X < 14) = P(-1 < Z < 0.67)$

$= 0.5899$ → 1

(iii) 74 → ½ , 3 diagrams → 1

45 a) (i) $k = 1/16$ → 3

(ii) $f(x) = \begin{cases} \frac{1}{4}(x-1)^3 & 1 < x < 3 \\ 0 & \text{otherwise} \end{cases}$ → 2

45 (b) $n = 50$, $\bar{x} = 10$, $S = 3.5$, $\mu = 9.5$

$= \sigma$ → 1

$H_0 : \mu = 9.5$, → ½ $H_1 : \mu \neq 9.5$ → ½

$Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$ → 2 = 1.01 → ½ < 1.96

H_0 is accepted → ½

46 a) $\Sigma P_0 q_0 = 1220$, → ½ $\Sigma P_0 q_1 = 1600$ → ½

$\Sigma P_1 q_0 = 1341$, → ½ $\Sigma P_1 q_1 = 1784$ → ½

$P_{01}^F = 110.706$, → 1 T.R.T = 1 → 1

F.R.T = $\frac{1784}{1220} = \frac{\Sigma P_1 q_1}{\Sigma P_0 q_0}$ → 1

b) $\bar{\bar{x}} = 44.2$, → 1 $\bar{R} = 15.8$, $CL = \bar{\bar{x}}$

$UCL = \bar{\bar{x}} + A_2\bar{R} = 47.56$ → 1

$LCL = \bar{\bar{x}} - A_2\bar{R} = 40.8$ → 1 out

Graph → 2

47 a) NWC cost = 94 → 1

Sch. is A → I, B → I, B → II, C → II, C → III

LCM, cost = 61 → 1

Sch. is A → III, B → I, B → III, C → II, C → III → 1

VAM, cost = 40 → 1

Sch. is A → I, B → I, B → III, C → I, C → II. → 1

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

$= \log(x+1) + \frac{2}{x+1} + 3\log(x-3) + C$ → 2

Handling Teachers	Signature
1. R. prabhaharan	
2. T. Madhan	T. Madhan
3. K. Sundari	