KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD
II PUC EXAMINATION – 1, MARCH 2025

Subject: 31-STATISTICS **MODEL ANSWERS** **MAX. MARKS: 80**

Q. NO.	SECTION – A	MARKS
I. 1.	d) Fecundity	1
2.	b) 100	1
3.	a) Mean = variance	1
4.	b) Accepting H_0 when it is not true.	1
5.	c) $\Sigma a_i = \Sigma b_j$	1
II. 6.	Retail	1
7.	Asymptotic	1
8.	Size	1
9.	Defect	1
10.	Degenerate	1
III. 11.		
a)	iii) Σ Annual ASFRs	1
b)	vi) Factor Reversal Test	1
c)	v) x = 0,1	1
d)	i) H_0: $P_1 = P_2$	1
e)	iv) Inventory model – II	1
IV. 12.	Size of the cohort.	1
13.	War, Floods, Strikes, Lockouts, Earthquakes etc. (Any one)	1
14.	Mean = 0	1
15.	Statistical constant of the population.	1
16.	Maximum of the row minimums.	1

Q. NO.	V. SECTION – B	MARKS
17.	**110** **120**	1 1
18.	(i) There are no sudden jumps in the values of dependent variable from one period to another. (ii) There is a sort of uniformity in the rise or fall of the values of the dependent variable. (iii) There will be no consecutive missing values in the series. (Any two)	1 1
19.	S.D. (X) = $\sqrt{pq}$ = **0.4**	1 1
20.	Median = **9.34** Mode = **8**	1 1
21.	Point estimation Interval estimation	1 1
22.	$t = \frac{\bar{d}}{S_d/\sqrt{n-1}}$ d.f. = n-1	1 1
23.	UCL = $\lambda' + 3\sqrt{\lambda'}$ = $4 + 3\sqrt{4}$ = **10**	1 1
24.	$Q^0 = \sqrt{\frac{2C_3R}{C_1}}$ = **500** units	1 1

Q. NO.	VI. SECTION – C	MARKS
25.	$P = \frac{p_1}{p_0} \times 100$ **Or** $P = \frac{4600}{4000} \times 100 = 115$	1
	P: 115 120 126 150 120	1
	WP: 2300 1200 1260 3000 2400 ΣWP: **10,160**	1
	CLI(FBM) = $\frac{\Sigma WP}{\Sigma W} = \frac{10160}{80} = \mathbf{127}$	1+1
26.	10 14 - 27 46 70 - y_0 y_1 y_2 y_3 y_4 y_5 y_6	1
	$(y-1)^5 = 0$ or $\Delta^5 y_0 = 0 \Rightarrow y_5 - 5y_4 + 10y_3 - 10y_2 + 5y_1 - y_0 = 0$	1
	$y_2 = \mathbf{17}$	1
	$y_6 - 5y_5 + 10y_4 - 10y_3 + 5y_2 - y_1 = 0$	1
	$y_6 = \mathbf{89}$	1
27.	n = 4, p = 0.4, q = 0.6, $p(x) = {}^4C_x\ (0.4)^x (0.6)^{4-x}$; x = 0,1, 2, 3, 4.	1
	(a) $p(2) = {}^4C_2\ (0.4)^2(0.6)^{4-2}$	1
	= 0.3456	1
	(b) $P(X \geq 1) = 1 - p(0) = 1 - {}^4C_0\ (0.4)^0(0.6)^{4-0}$	1
	= 0.8704	1
28.	Mean, $E(X) = \frac{na}{a+b}$	1
	$= \frac{5x6}{6+4} = \mathbf{3}$	1
	Variance, $V(X) = \frac{nab(a+b-n)}{(a+b)^2\ (a+b-1)}$	1
	$= \frac{5x6x4(6+4-5)}{(6+4)^2\ (6+4-1)} = \frac{600}{900} = \mathbf{0.6667}$	1+1
29.	$H_0: \mu = \mu_0$ (55) and $H_1: \mu \neq \mu_0$ (55)	1
	$Z = \frac{\bar{x}-\mu_0}{s/\sqrt{n}} = \mathbf{2}$	1+1
	k = ±1.96	1
	∴ H_0 is rejected.	1
30.	A_1 dominates A_2 and A_3. B_2 dominates B_1, B_3 and B_4. A_1 dominates A_4.	2
	Best strategy for Player A is A_1, Best strategy for Player B is B_2,	1
	Value of the game, v = 0.	1
	Game is fair.	1
31.	ΣC_i : 1000 3000 6100 10600 16600	1
	$P - S_n$: 10000 14000 17000 20000 22000	1
	T(n) : 11000 17000 23100 30600 38600	1
	A(n) : 11000 8500 7700 **7650** 7720	1
	∴ The optimal replacement period, n = **4** years.	1

Q. NO.	VII.	MARKS
32.	$\mu = 600$, $\sigma = 50$, $Z = \frac{X-600}{50}$ is a S.N.V.	1
	$P(550 \leq X \leq 650) = P(-1 \leq Z \leq 1)$	1+1
	= 0.8413 – 0.1587 = **0.6826**	1
	Among 400 workers, 400 x 0.6826 = 273.04 ≅ **273** workers.	1
33.	H_0: Accidents occur uniformly throughout the week, and H_1: Accidents do not occur uniformly throughout the week.	1
	Table, finding (O-E), $\frac{(O-E)^2}{E}$ values	1+1
	$\chi^2 = \sum \frac{(O-E)^2}{E} = \mathbf{8}$	1
	6 d.f., $k_2 = 16.8$, ∴ H_0 is Accepted.	1
34.	C.L. = $\bar{R} = \frac{\Sigma R}{k} = \mathbf{5}$	1
	L.C.L. = $D_3\bar{R} = \mathbf{0}$	1+1
	U.C.L. = $D_4\bar{R}$ = 2.285 x 5 = **11.41**	1+1
35.	Co-ordinates: (0,2), (4,0) and (0,4), (6,0).	1
	Drawing two lines.	1
	Identification of F.R. and its corner points: A(0,4), B(6,0), C(0,2) and D(4,0)	1
	Objective function values: $Z_A = 20$, $Z_B = 24$, $Z_C = 10$ and $Z_D = 16$	1
	Maximum value of Z = **24** and optimal solution: x = **6** & y = **0**	1

Q. NO.	VIII. SECTION – D	MARKS
36. (a)	WSFR = $\frac{\text{Number of female births in a specified age group in a year}}{\text{Total number of females in that particular age group in a year}}$ x 1000 **Or** $WSFR_{15\text{-}19} = \frac{252}{14000}$ x 1000 = 18	 1
	WSFR: 18 65 70 42 24 14 3 ΣWSFR: **236**	2
	GRR = i x ΣWSFR = 5 x 236 = **1180**	1+1
(b)	ASDR = $\frac{\text{Number of deaths in a specific age group in a year}}{\text{Total population in that age group in a year}}$ x 1000 **Or** $ASDR_{0\text{-}21} = \frac{143}{11000}$ x 1000 = 13	 1
	ASDR(A): 13 05 13 30	1
	PA: 130000 75000 195000 300000 ΣPA = **7,00,000**	1
	$STDR_A = \frac{\Sigma PA}{\Sigma P} = \frac{700000}{50000} = \mathbf{14}$	1+1
37.	p_1q_0: 504 672 270 420 Σp_1q_0 = **1866**	1
	p_0q_0: 384 504 324 315 Σp_0q_0 = **1527**	1
	p_1q_1: 630 840 450 600 Σp_1q_1 = **2520**	1
	p_0q_1: 480 630 540 450 Σp_0q_1 = **2100**	1
	$P_{01}^{(L)} = \frac{\Sigma p_1q_0}{\Sigma p_0q_0} \times 100$ = **122.2**	1+1
	$P_{01}^{(P)} = \frac{\Sigma p_1q_1}{\Sigma p_0q_1} \times 100$ = **120**	1+1
	$P_{01}^{(F)} = \sqrt{P_{01}(L) \times P_{01}(P)}$ = **121.095**	1+1
38.	Table, n = 5, Σx = 0, Σy = 130, $\Sigma x^2 = 10$, $\Sigma x^3 = 0$, $\Sigma x^4 = 34$, Σxy = -10, $\Sigma x^2y = 274$ (When x: -2, -1, 0, 1, 2)	5
	By substituting and solving the normal equations, a = **24**, b = **–1** and c = **1**	 1+1+1
	The quadratic trend equation is: $y = 24 - x + x^2$	 1
	$\hat{y}_{2024}$ = **30**	1
Q. NO.	**SECTION – E (for visually challenged students only)**	**MARKS**
35.	Procedure of solving the linear programming problem graphically.	5

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