



- Note:**
1. Graph sheets and statistical tables will be supplied on request.
 2. Scientific calculators are allowed.
 3. All working steps should be clearly shown.

Section– A

I. Answer any TEN of the following:

10 × 1 = 10

1. What is life table?
2. Mention one characteristic of index number.
3. What is value index number?
4. Give an example for seasonal variation.
5. What is the probability that a normal variate takes a value greater than mean?
6. Under what conditions Poisson distribution tends to normal distribution?
7. What is parameter space?
8. What is Critical Value?
9. Write the formula of S.E ($\bar{X}_1, - \bar{X}_2$).
10. Define acceptance sampling plan.
11. Define E.O.Q.
12. What is Saddle point?

Section– B

II. Answer any TEN of the following:

10 × 2 = 20

13. There was a record of 4000 live births in a city in a year. The number of neonatal deaths was 100. Calculate the neonatal mortality rate.
14. The sum of the product of current year quantity and base year price is 450 and the sum of the product of base year quantity and price is 350. Find the quantity index number.
15. Why Fisher's index number is called ideal index number?
16. What is random variation? Give an example.
17. Write down the conditions for applying Newton's advancing difference method of interpolation.
18. Write down the Bernoulli distribution with parameter $p=0.25$.
19. Write applications of χ^2 - distribution.
20. Define level of significance and critical region.
21. Given, $\bar{x}=53\text{gm}$, $\mu=50\text{gm}$, $s=5\text{gm}$ and $n=17$, calculate test statistic t .
22. If $p^1=0.02$, $n=100$ calculate UCL and LCL for np-chart.
23. Define degenerate solution.
24. Define pure and mixed strategy.

Section – C

III. Answer any EIGHT of the following:

8 × 5 = 40

25. From the following data compute N.R.R.

Age (years)	Female Population	Female Births	Survival Rates
15-19	26730	600	0.95
20-24	19725	630	0.93
25-29	18600	800	0.9
30-34	18000	1900	0.85
35-39	17000	1600	0.8
40-44	16500	800	0.75
45-49	15000	630	0.72

26. Calculate P_{01} by simple average of price relatives using (i) Arithmetic mean (ii) Geometric mean.

Items	Prices in 2012	Prices in 2014
A	26	28
B	32	30
C	18	20

D	12	12
E	40	45

27. Explain the steps involved in the construction of Index numbers.

28. Obtain the trend values by 5 yearly moving average method for the following time series.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production (in 000's tones)	15	16	18	18	20	19	22	24	25

29. Interpolate the missing values from the following data using Binomial expansion method.

Year	2006	2007	2008	2009	2010	2011	2012
Value	64	60	?	56	55	50	?

30. In an office 20% of the employees are females. In a random sample of 5 employees obtain the probability that there are (i) no females (ii) females only.

31. A pond has 20 fishes of which 8 are red and remaining are white. Four fish are caught. Find the mean and variance of the number of red fishes caught.

32. From the following table, test whether the sample means differs significantly at 5% L.O.S.

	I	II
Size	80	90
Means	52	55
S.D.	8	7

33. Weight of 10 jack fruits are as follows:

Weight (kgs): 6, 5, 8, 7, 4, 5, 8, 6, 5, 6.

Test at 5% level of significance that SD differs significantly from 2 kgs.

34. For the following data, find the control limits for \bar{X} and R – chart.

Subgroup No.	1	2	3	4	5	6
Mean	52	48	53	49	50	48
Range	10	11	8	12	9	10

35. From the following pay-off matrix of player A, solve the game by maximin–minimax principle.

		Player B			
		B ₁	B ₂	B ₃	B ₄
Player A	A ₁	3	2	1	6
	A ₂	3	1	0	4
	A ₃	3	4	-3	0

36. Solve the following L.P.P graphically.

Minimize $Z = 4x + 3y$

Subject to $x + y \leq 2$

$x + 3y \geq 3$ and $x, y \geq 0$

Section – D

IV. Answer any TWO of the following:

2× 10 = 20

37. Compute C.D.R's and S.T.D.R's for the following two populations and compare the mortality.

Age (years)	Town A		Town B		Standard Population
	Population	Deaths	Population	Deaths	Deaths
0-9	15000	150	15000	200	12000
10-19	13000	80	12000	150	13000
20-39	10000	40	20000	75	14000
40-59	8000	55	12000	45	12000
60-79	6000	110	8000	175	8000
80+	2000	150	5000	250	6000

38. Construct Fisher's price index number for the following data. Test whether it satisfies TRT and FRT.

Commodity	Base year		Current year	
	Price (Rs)	Quantity	Price (Rs)	Expenditure
A	7	70	9	100
B	9	80	11	110
C	15	25	20	40
D	20	30	25	40

39. Fit a straight line trend for the following data and hence find trend values. Estimate the price for the year 2013 of a certain commodity.

Year	2007	2008	2009	2010	2011
Price (Rs)	12	20	31	40	47

40. Fit a Binomial distribution for the following data and test whether it is a good fit at $\alpha = 5\%$.

No. of heads	0	1	2	3	4	5
No. of tosses	5	28	34	30	21	10

Section – E

V. Answer any TWO of the following:

2× 5 = 10

41. Heights of 360 children are normally distributed with mean=120cms and variance=4cm². Find expected number of children having heights (i) greater than 118cm (ii) less than 122 cm.
42. A machine produced 6 defective articles among 50 articles. Test whether the proportion of defective articles is less than 10%. (use $\alpha=5\%$)
43. From the following data, test whether 'education' and 'employment' are independent at 5% level of significance.

Education	Employment	
	Employed	Unemployed
Educated	30	28
Uneducated	25	35

44. The cost of a scooter is Rs.36,000. Its resale value and maintenance cost at different years is given below.

Year of Service	1	2	3	4	5	6
Maintenance Cost (Rs.)	800	1,300	1,900	2,700	3,900	5,400
Resale Value (Rs.)	28,000	22,000	20,000	18,000	17,000	16,000

Determine the optimal year for replacement of the scooter.
