Duration: 3 Hrs 15 mins   **Max.Marks**: 100

Note: 1. Statistical tables and graph sheets will be supplied.
  2. Scientific calculators are allowed.
  3. All working steps should be clearly shown.

PART – A

I.   Answer any ten questions: **1×10 =10**

1. Define cohort.
2. Mention the Index number which satisfies both TRT and FRT.
3. Mention any one use of cost living index number.
4. Which index number is used for measurement of seasonal variation?
5. Write down the relationship between mean and variance of binomial distribution.
6. If X is Poisson variate with mean 3. What is its standard deviation?
7. Define composite hypothesis.
8. In a $\left(\chi^2\right)$ chi-square test for goodness of fit if there are 8 classes and if 1 parameter is estimated what is the degree of freedom of the test statistic?
9. Define test statistic.
10. What is a defect?
11. Define no solution in L.P.P.
12. What is pure strategy in a game?

PART – B

II.   Answer any 10 questions: **2×10 =20**

13. In a life table, if l_1 = 95,400 and l_2 = 93,492 then, find survival ratio and mortality ratio of the first year.
14. Calculate the consumer price index number using the following data

Items	Group Indices	Group weights
A	102	8
B	97	6
C	108	12
D	110	4

15. State circular test in Index number.
16. Given the parabolic equation y = a+bx+cx^2, write down the normal equations.
17. Write the formulae of finding 'x' and 'y$_x$' of Newton's method of interpolation.
18. Under what conditions, does Binomial distribution tends to Poison distribution?
19. The first probability term is equal to the second probability terms of a Poison distribution. Then find the mean.
20. Find the area under the normal curve between Z = - 1.5 and Z = + 1.5
21. A sample of 100 children was chosen from a population. If weight of these children is 20 kgs and variance is 16 kgs. Find the standard error of mean weight of selected children.
22. Mention the types of causes of variation in a manufacturing process.
23. Mention two method of obtaining initial basic fesible solution for a transportation problem.
24. Give two disadvantages of the inventory.

PART – C

25. From the following data calculate GFR

Age (in yrs)	Female Population	No. of live births
15-19	5000	100
20-24	6000	700
25-29	4500	800
30-35	2500	100
35-39	2500	100
40-44	2000	50
45-49	1000	10

26. Explain the steps involved in the construction of cost of living index number.

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

Items	A	B	C	D	E
Price in 2012	26	32	18	12	40
Price in 2014	28	30	20	12	45

28. Complete 5 yearly moving averages for the following time series and indicate trend.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Value	27	28	30	32	29	31	34	36	35

29. For the following table determine the missing values.

X	1	2	3	4	5	6	7
Y	185	167	?	146	121	80	?

30. Assuming that birth to male and female to be equally likely. Find the probability that a equally likely. Find the probability that a family with 4 children will have (i) three or more daughter (ii) no daughter

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

32. From the following data, test whether, there is any significant difference between mean mark of students in two subjects.

Subjects	Mean marks	Variance	Sample Size
Statistics	84	10	12
Accountancy	80	8	10

33. The standard deviation of weights of 15 new born babies 0.36 kgs. Test at 5% level of significance that the standard deviation of weights of new born babies is less than 0.4 kg.

34. Partition panels are manufactured by a firm. A crack or unthickness or a bubble or improper spread of design of paint is considered as defect. Following panels is considered as defect. Following panels containing defects are noted as below:

Sample panel	1	2	3	4	5	6	7	8	9	10
No. of defects	2	1	0	4	3	2	1	0	4	0

Draw control chart for the above data and analyse the data.

35. Graphically solve the following L.P.P

Max Z = 20x + 80y

S.t $2x + 6y \le 60$

$x + 4y \le 32$

& $x, y \ge 0$

36. The cost of a machine is Rs 6600 and its resale value is Rs 600. The maintenance costs in different years are as follows.

Year	1	2	3	4	5	6	7
Maintenance cost (Rs)	250	300	450	600	900	1500	1800

Determine the age at which the machine should be replaced.

PART – D

IV. Answer any 2 questions: 10×2 =20

37. From the following data, calculate the STDR's for locality A and locality B. Taking locality A as standard population & comment.

Age (in years)	Locality A		Locality B	
	Population	Deaths	Population	Deaths
Below 10	4000	60	8000	80
10-35	9000	45	13000	65
35-65	7000	70	10000	90
65& above	3000	120	4000	200

38. Construct Fisher's Price Index number for the following data. Test whether it satisfies Time Reversal Test & Factor Reversal Test.

Commodity	Base year		Current year	
	Price(Rs)	Quantity	Price(Rs)	Quantity
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. Also estimate the price for the year 2013.

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

40. Fit a Poisson distribution to the following data:

No. of cars sold	0	1	2	3	4	5	6&more
No. of days	18	43	45	28	12	3	1

Test whether the Poisson distribution is a good fit.

PART – E

V. Answer any 2 questions: 2 × 5 =10

41. The weekly wages of workers are normally distributed with mean Rs 3,000 & S.D Rs 500. Find the probability of workers whose weekly wages will be i) more than Rs 3,400 ii) Between Rs 2,500 & Rs 3,500.

42. 28 students passed among 45 randomly selected students a college. 32 students passed among 55 randomly selected students of another college. Test whether passing proportions is same in both the colleges (use $\alpha = 5\%$).

43. Find the solution of the game by the principle of dominance for the following pay-off matrix of A.

$$\begin{array}{c} \text{Player B} \\ \begin{array}{cccc} B_1 & B_2 & B_3 & B_4 \end{array} \\ \text{Player A} \quad \begin{array}{c} A_1 \\ A_2 \\ A_3 \\ A_4 \end{array} \begin{bmatrix} -7 & 0 & 3 & -5 \\ 7 & -2 & 0 & -4 \\ -2 & -1 & -2 & 0 \\ 4 & 2 & 3 & 6 \end{bmatrix} \end{array}$$

44. There is a demand for 5,000 items per year. The replenishment cost Rs 100 and the maintenance cost Rs 10 per iterm per year. Replenishment is instantaneous and shortages are not allowed find:
    i)   optimal lot size
    ii) optimum time between orders
    iii) optimum number of orders
    iv) minimum annual average inventory cost.