

**HIGHER SECONDARY SECOND YEAR  
STATISTICS**

**MODEL QUESTION PAPER - 1**

**TIME: 2.30HOURS**

**MARKS: 70**

**Part-1**

**ANSWER ALL THE QUESTIONS:-**

**I. Choose the correct answer from the given alternatives:- 15 × 1 = 15**

1. 'A book on games of Chance' written by a mathematician Jerane Cardon was published in the year

a) 1663

b) 1773

c) 1883

d) 1993

2. Var (4x+7)

a) 4 Var (x)

b) 8 Var (x)

c) 16 Var (x)

d) 11 Var (x)

3. For a discrete distribution function  $F(x_j) - F(x_{j-1}) =$

a)  $P(x_{j-1})$

b)  $P(x_j)$

c) 0

d) 1

4. The trials in a binomial distribution are

a) Mutually exclusive

b) non-mutually exclusive

c) Independent

d) non-independent

5. In a normal distribution, skewness is

a) One

b) zero

c) greater than one

d) less than one

6. A hypothesis may be classified as

a) Simple

b) composite

c) Null

d) All the above

7. Standard error of number of success is given by

a)  $\frac{\sqrt{pq}}{n}$

b)  $\sqrt{npq}$

c) npq

d)  $\frac{\sqrt{np}}{q}$

8. If  $P = \frac{2}{3}$  then  $Q =$

a)  $\frac{2}{3}$

b)  $\frac{3}{2}$

c)  $\frac{1}{3}$

d)  $\frac{3}{4}$

9. The mean of t-distribution is

a) 0

b) 1

c)  $\bar{x}$

d)  $\frac{s}{\sqrt{n}}$

10. Degrees of freedom for Chi-square test in case of contingency table of order 4×3 are

a) 12

b) 9

c) 8

d) 6

11. In the case of one-way classification, the total variation can be split into

- a) Two components
- b) three components
- c) four components
- d) only one components

12. Business forecasts are made on the basis of

- a) Present data
- b) past data
- c) Policies and circumstances
- d) all the above

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24. What is a Pay-off Matrix?

### Part-3

6×3=18

**Answer any of the six questions. Question No.30 is compulsory.**

25. A whole number is selected from a set of numbers from 20 to 30. Find the probability of getting a prime number

26. Test whether  $f(x) = \begin{cases} 5x^4 & 0 < x < 1 \\ 0 & \text{Otherwise is a} \end{cases}$

probability density function of a continuous random variable

27. If X is a poisson variable with Parameter 5, find the value of  $E(x^2)$

28. A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.

29. Give any three properties of chi-square distribution.

30. In an one way analysis of variance, test whether any difference is between treatments from the following data SST=10, SSE=18 and the respective degrees of freedom are 2 and 12.

31. Write a short note on cyclical variations

32. In a group of 400 students, the number of married is 160. Out of 120 students who failed 48 belonged to the married group. Find out whether the attributes of marriage and failure are Independent.

33. Calculate EMV and thus select the best act for the following pay-off table:

States of nature	Probability	Pay-off (Rupees) by the player		
		A	B	C
X	0.3	-2	-5	20

Y	0.4	20	-10	-5
Z	0.3	40	60	30

Part-4

5\*5=25

Answer all the questions:-

34. (a) A manufacturing firm produces steel pipes in three plants with daily production volumes of 500, 1000 and 2000 units respectively. According to past experience, it is known that the fractions of defective out puts produced by the three plants are respectively, 0.005, 0.008 and 0.010. If a pipe is selected from days total production and found to be defective, what is the probability that it came from the (i) first plant, (ii) the second plant, (iii) the third plant?

(Or)  
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(b) Three cards drawn at random successively with replacement, from a well shuffled pack of 52 cards. Getting a card of diamond is termed as success. Find the mean and standard deviation of the distribution of the number of successes.

35. (a) The probability of the evening college student will be a graduate is 0.4. Determine the probability that out of 5 students (i) none, (ii) one, (iii) atleast one will be a graduate.

(Or)

(b) Describe in detail level of significance and critical value.

36. (a) Test the significance at 5% level of significance the samples from the following data

	Size of sample	Mean	S.D
Sample A	100	50	4
Sample B	150	51	5

(Or)

(b) Two random samples drawn from two normal populations are.

Sample I	20	16	26	27	22	33	18	24	19	25	-	-
Sample II	27	33	42	35	32	34	38	28	41	43	30	37

Obtain the estimates of the variance of the population and test at 5% level of significance whether the two populations have the same variance

37. (a) The following figures relate to production in kg of three varieties A,B and C of wheat shown in 12 plots.

A	20	18	19		
B	17	16	19	18	
C	20	21	20	19	18

Is there any significant difference in the production of the three varieties.

(Or)

(b) Explain in detail, classes, class frequencies and the relationship between the class frequencies in the study of association of attributes.

38. (a) Find the seasonal variations by simple average method for the data given below.

Quarters				
Year	I	II	III	IV
1989	30	40	36	34
1990	34	52	50	44
1991	40	58	54	48
1992	54	76	68	62
1993	80	92	86	82

(Or)

(b) A manufacturing company has to select one of the two products A or B for manufacturing. Product A requires investment of ₹ 20000 and product B of ₹ 40000 market research shows high, medium and low demand with the corresponding probabilities and returns from sales in ₹ 1000 for the 1000 products in the following table.

Market demand	Probability		Return from tables	
	A	B	A	B
High	0.4	0.3	50	80
Medium	0.3	0.5	30	60
Low	0.3	0.2	10	50

Construct an appropriate decision tree. What decision the company should take?

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**MODEL QUESTION PAPER - 2**

**TIME: 2.30HOURS**

**MARKS: 70**

I. Choose the right answer:-

**15 × 1 = 15**

1. An Integer is chosen from 1 to 20. Find the probability that it is divisible by 4

a)  $\frac{1}{4}$

b)  $\frac{1}{3}$

c)  $\frac{1}{2}$

d)  $\frac{1}{10}$

2. If F(x) is a distribution function then F(-∞) is

a) -1

b) 0

c) 1

d) -∞

3. In a normal distribution N(60,9) the Quartile deviation is \_\_\_\_\_

a) 60

b) 9

c) 3

d) 2

4. In the right tailed test, the critical region is

a) 0

b) 1

c) lies entirely in right tail

d) lies in the left tail

5. Large sample theory is applicable when

a)  $n > 30$

b)  $n < 30$

c)  $n < 100$

d)  $n < 1000$

6. The variance of the sampling distribution of the mean

a)  $\sigma^2$

b)  $\frac{\sigma}{n}$

c)  $n \sigma^2$

d)  $\frac{\sigma}{\sqrt{n}}$

7. The test for significance of the difference between two sample means, the population variances being equal but unknown

a) t- test

b)  $x^2$  - test

c) f - test

d) z - test

8. The greater the discrepancy between the observed and expected frequency \_\_\_\_\_ the value of  $\lambda^2$
- a) Decreases
  - b) increases
  - c) Does not change
  - d) becomes zero
9. Equality of several normal population means can be tested by
- a) t- test
  - b)  $\chi^2$  - test
  - c) f - test
  - d) z - test
10. Simple average method is used to calculate
- a) Trend values
  - b) cyclic variations
  - c) Seasonal indices
  - d) none of these
11. Which of the following methods for measuring the trend is useful for estimation?
- a) graphical method
  - b) semi average method
  - c) moving average method
  - d) method of least square
12. Measures of association in usually deal with
- a) Attributes
  - b) Quantitative factors
  - c) Variables
  - d) numbers
13. If the attributes A and  $\beta$  is such that  $(A\beta)=0$  then the relationship between them is
- a) Positive
  - b) negative
  - c) Independent
  - d) dependent
14. The criterion which selects the action for which maximum pay-off is lowest is known as
- a) max-mini criterion
  - b) min-max criterion
  - c) max-max criterion
  - d) none of these
15. Which of the following methods while selecting an action minimum and maximum pay-off are taken in account?
- a) maxi-min
  - b) maxi-max
  - c) mini-max
  - d) Hurwicz method

Part-2

Answer any of the six questions. Question No.20 is compulsory  $6 \times 2 = 12$

16. Define conditional probability.
17. State the characteristic function for a discrete random variable
18. Give any two examples of Poisson distribution.
19. Define Null Hypothesis.
20. Write short note on Yate's correction.
21. In a two way analysis of variation consisting of 4 treatments and 5 varieties. Find the degrees of freedom of errors and of total number of elements.
22. The trend values obtained for the years 1990 and 1994 under the method of least squares are 50.2 and 52.2. find the equation of the trend line?
23. Verify whether the given data  $N=60$ ,  $(A)=51$ ,  $(B)=32$ ,  $(AB)=25$  are consistent.
24. Write the uses of decision tree.

Part-3

Answer any of the six questions. Question No.29 is compulsory.  $6 \times 3 = 18$

25. Two cards are drawn at random from a pack of 52 cards. Find the probability that the cards drawn are a king and a queen?
26. A player throws a fair die. If a prime number occurs he wins that number of rupees but if a non-prime number occurs he loses that number of rupees. Find the expected gain of the player and conclude.
27. In a normal distribution, determine the limits of the central 50% of the area.
28. Write a short note on sampling distribution.
29. A car company decided to introduce a new car whose mean petrol consumption is claimed to be lower than that of the existing car. A sample of 50 new cars were taken and tested for petrol consumption. It was found that mean petrol consumption for the 50 cars was 30km per liter with a standard deviation of 3.5km per liter. Test at 5% level of significance whether the

company's claim that the new car petrol consumption is 28 km per liter on the average is acceptable.

30. A random sample of size 20 from a population gives the sample Standard Deviation of 12. Test the hypothesis that the population Standard Deviation is 9.
31. Draw a trend-line with the help of method semi-averages.

Year	1996	1997	1998	1999	2000	2001	2002
Release	600	800	1000	800	1200	1000	1400

32. Find whether A and B are Independent from the following data.  
 $(AB)=256$ ,  $(\alpha B)=768$ ,  $(A\beta)=48$ ,  $(\alpha \beta)=144$
33. Explain 'Hurwicz criterion'.

#### Part-4

**Answer all the questions:-**

**5×5=25**

34. (a) Two cards are drawn at random from a pack of 52 cards. Find the probability that the cards drawn are (i) a diamond and a spade, (ii) a king and a queen and (iii) 2 aces.

(Or)

(b) In a continuous distribution whose probability density function is given by  $f(x) = \frac{3}{4}x(2-x); 0 < x < 2$ . Find the expected value of x and standard Deviation.

35. (a) X is normally distributed with Mean 12 and standard deviation 4. Find the probability of the following (i)  $P_s(x > 20)$ , (ii)  $\{(x < 20)\}$ , (iii)  $P_{ss}(0 < x < 12)$ .

(Or)

(b) Write a detailed note on one tailed and two tailed test.

36. (a) In a referendum submitted to the 'student body' at a university 850 men and 550 women voted. 530 of the men and 310 of the women voted 'yes'. Does this indicate a significant difference of the opinion on the matter between men and women students?

(Or)

(b) 1000 students at college level were graded according to their IQ and the economic conditions of their homes. Use  $\chi^2$  test to find out whether there is any association between economic condition at home and I.Q.

Economic Conditions	IQ		Total
	High	Low	
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

37. (a) Apply the technique of analysis of variance to the following data relating to yields of varieties of wheat in 3 blocks.

Varieties	1	2	3
I	10	9	8
II	7	7	6
III	8	5	4
IV	5	4	4

(Or)

(b) Suppose that a decision maker faced with three decision alternatives and four states of nature. Given the following profit pay-off table.

Acts	States of Nature			
	S1	S2	S3	S4
A1	16	10	12	7
A2	13	12	9	9
A3	11	14	15	14

Assuming that he has no knowledge of the probabilities of occurrence of the states of nature. Find the decisions to be recommended under each of the following criteria.

- (i) maximin (ii) maximax (iii) minimax regret.

38. (a) Calculate three yearly moving average of the following data.

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Number of Students	15	18	17	20	23	25	29	33	36	40

(Or)

(b) Can vaccination be regarded as a preventive measure of small pox from the data given below? of 1482 persons in a locality exposed to small pox 368 in all were attacked Among the 1482 persons 343 had been vaccinated, among those only 35 and were attacked.

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8. Analysis of variance technique was originated in the field of
- a) Agriculture
  - b) Industry
  - c) Biology
  - d) Genetics
9. In the case of one-way classification with  $t$  treatments, the mean sum of squares for treatment is
- a)  $SST/N-1$
  - b)  $SST/t-1$
  - c)  $SST/N-t$
  - d)  $SST/t$
10. Semi average method is used to calculate
- a) Trend values
  - b) cyclic variations
  - c) Seasonal indices
  - d) none of these
11. If the slope of the trend line is positive it shows
- a) Rising trend
  - b) declining trend
  - c) Stagnation
  - d) none of the above
12. With the two attributes, the total number of class frequencies is
- a) 16
  - b) 15
  - c) 14
  - d) 9
13. In the case of two attributes  $(AB) + (A\bar{B}) + (\bar{A}B) + (\bar{A}\bar{B}) =$
- a) A
  - b)  $\beta$
  - c)  $(A)+(B)$
  - d) N
14. Which of the following does not apply to a decision tree?
- a) A square node is a point at which a decision must be made
  - b) A circular node represents an encounter with uncertainty
  - c) one chooses a sequence of decisions which have the greatest probability of success.
  - d) One attempts to maximize expected return
15. For which measure the table of loss is a must
- a) maxi-min
  - b) maxi-max
  - c) mini-max
  - d) Hurwicz method

**Part-2****Answer any of the six questions. Question No.17th is compulsory**      **6×2=12**

16. Define statistical probability.

17. Find the derivative of  $y = \frac{x^2+1}{x-5}$  with respect to x.

18. A continuous random variable x is said to have a normal distribution its

probability density function  $f(x) = \frac{1}{5\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-60}{5}\right)^2}$  find mean and variance of x.

19. Define Sampling distribution.

20. State the assumption of students 't' tests.

21. The standard deviations calculated from two samples of sizes 9 and 13 are 2.1 and 1.8 respectively. Can the samples be regarded as drawn from normal populations with the same standard deviation?

22. Distinguish between t-test for difference between means and ANOVA

23. What is 'Time series'?

24. What is the criteria of pessimism (maxi-mini)?

**Part-3****Answer any of the six questions. Question No.28 is compulsory.**      **6×3=18**

25. Find the probability distribution of x when 3 coins are tossed, where x is defined as the number of heads found in an outcome.

26. In a Poisson distribution  $3P(x=2)=P(x=4)$ . Find the parameter 'm'.

27. Define parameter and statistic.

28. A person throws 10 dice 500 times and obtains 2560 times 4, 5 or 6. Can this be attributed to fluctuations of sampling?

29. A drug is given to 10 patients and the increments in their blood pressure were recorded to be 3, 6, -2, 4, -3, 4, 6, 0, 0, and 2. Is it reasonable to believe that the drug has no effect on change of blood pressure?
30. Define non-parametric test.
31. State all the assumptions involved in analysis of variance technique.
32. What are the merits and demerits of the method of least square.
33. Write briefly about association of attributes.

## Part-4

**Answer all the questions:-****5×5=25**

34. (a) A test paper containing 10 problems is given to three students A, B, and C. it is considered that student A can solve 60% problems. Student B can solve 40% problems and student C solves 30% problems. Find the probability that the problem chosen from the test paper will be solved by the following.

- (i) Find the probability of C not solving the problem?
- (ii) Find the probability of C along not solving the problem?
- (iii) C not solving the sum when the solution is obtained?

(Or)

(b) Two researchers adopted different sampling techniques while investigating the same group of students to find the number of students falling in different intelligence levels. The results are as follows.

Researchers	Number of Students				Total
	Below average	Average	Above average	Genius	
X	86	60	44	10	200
Y	40	33	25	2	100
Total	126	93	69	12	300

Would you say that smoking technique adopted by the two researcher are independent?.

**35. (a) A random variable X has the following probability function**

Values X x	0	1	2	3	4	5	6	7
P(x)	0	K	2k	2k	3k	$K^2$	$2K^2$	$7K^2 + k$

(i) Find K (ii) find P ( $0 < X < 5$ ) (iii) find P ( $x \leq 6$ )

(Or)

(b) A manufacturer who produces medicine bottles finds that 0.1% of the bottles are defective. They are packed in boxes containing 500 bottles. A drug manufacture buys 100 boxes from the producer of bottles. Using poisson distribution find how many boxes will contain (i) no defective (ii) exactly 2 (iii) at least 2 defective.

36. (a) What are the procedures generally followed in testing of a hypothesis?

(Or)

(b) If 60 M.A Economics students are found to have a mean height of 63.60 inches and 50 M.Com students have a mean height of 69.51 inches. Would you conclude that the Commerce students are taller than Economics students? Assume the standard deviation of height of post-graduate students to be 2.48 inches.

37. (a) The following table gives the number of refrigerators sold by 4 salesman in three months May, June and July.

Machines	A	B	C	D
May	50	40	48	39
June	46	48	50	45
July	39	44	40	39

Carryout the analysis of variance?

(Or)

(b) A and B are independent. We have  $N=200$   $(A) =150$   $(AB)=120$ . Find the missing values.

38. (a) From the following data calculate the 4-yearly moving average and determine the trend values. Find the short term fluctuations. Plot the original data and the trend on a graph.

Year	93	94	95	96	97	98	99	00	01	02
Value	50	36.5	43	44.5	38.9	38.1	32.6	41.7	41.1	33.8

(Or)

(b) A florist stock highly perishable flower. A dozen at flower cost ₹ 3.00 and sells for 10.00. Any flower not sold the day are worthless. Demand in dozen of flowers are as follows.

Demand in dozen	0	1	2	3	4
Probability	0.1	0.2	0.4	0.2	0.1

Assuming the failure to satisfy any one customer's request will result in future lost profit amounting to ₹ 5.00 in addition to the lost profit on the immediate sale. How many flowers should the florist stock to expect maximum profits.