SASTRA DEEMED UNIVERSITY

(A University under section 3 of the UGC Act, 1956)

End Semester Examinations

March 2021

Course Code: **MAT132**

Course: **PROBABILITY & STATISTICS**

Question Paper No. : **U067**

Duration: **3** hours

Max. Marks:**100**

PART- A

Answer all the questions **10 x 2 = 20 Marks**

1. In a shooting test, the probability of hitting the target is ½ for A, 2/3 for B and 3/4 for C. If all of them fire at the target, find the probability that none of them hits the target.

2. The mean and variance of a binomial distribution are 4 and 4/3 respectively. Find $P(X \geq 1)$, if n =6.

3. Find the moment generating function of the Poisson's distribution.

4. What is meant by primary and secondary data?

5. What are the essential parts of a statistical table?

6. The weights (in kgs) of 15 students are as follows 31,35,27,29,32,43,37,41,34,28,36,44,45,42,30. Find the median? If the weight 44 kg is replaced by 46 kg and 27 kg is replaced by 25 kg respectively, find the new median?

7. The marks obtained by 10 students in an examination were as follows: 70, 65, 68, 70, 75, 73, 80, 70, 83, 86. Find the mean deviation about the mean.

8. What is meant by Type -1 and Type -II errors?

9. Write the test of statistic for t-distribution.

10. Write the test of statistic of difference of proportions in large sample

PART- B

Answer all the questions **4 x 15 = 60 Marks**

11. (a) A committee of 6 is to be formed from 5 lecturers and 3 Professors. If the members of the committee are chosen at random, what is the probability that there will be a majority of lecturers in the committee? (8)

(b) A bolt is manufactured by 3 machines A, B and C. A turns out twice as many items as B, and machines B and C produce equal number of items. 2% of bolts produced by A and B are defective and 4% of bolts produced by C are defective. All bolts are put into 1 stock pile and 1 is chosen from this pile. What is the probability that it is defective? (7)

(OR)

12. (a) A and B shoot independently until each has hit his own target. The probabilities of their hitting the target at each shot are 3/5 and 5/7 respectively. Find the probability that B will require more shots than A. (8)

(b) The mileage which car owners get with a certain kind of radial tyre is a random variable having an exponential distribution with mean 40,000 km. Find the probabilities that one of these tyres will last i)atleast 20,000 km and ii) atmost 30,000 km. (7)

13. (a) In 1990, out of total of 2,000 students in a college, 1,400 were for graduation and the rest for Post-graduation(P.G). Out of 1,400 Graduate students 100 were girls, however, in all there were 600 girls in the college. In 1995, number of graduate students increased to 1,700 out of which 250 were girls, but the number of P.G students fall to 500 of which only 50 were boys.

In 2000, out of 800 girls 650 were for graduates, whereas the total number of graduates was 2200. The number of boys and girls in P.G classes are equal. Represent the above information in tabular form. Also calculate the percentage increase in the number of graduate students in 2000 as compared to 1990. (8)

(b) Draw a bar chart of the procurement of rice (in tons) in an Indian state. (7)

Year	1998	1999	2000	2001	2002	2003
Rice(intons)	4500	5700	6100	6500	4300	7800

(OR)

14. (a) The following figures relate to the cost of construction of a house in Chennai.

Item	Cement	Steel	Bricks	Timber	Labour	Miscellaneous
Expenses	20%	18%	10%	15%	25%	12%

Represent the data by Pie diagram. (8)

(b) The distribution of monthly wages (in Rs.) of 40 workers in a factory is given below. (7)

Monthly wages	210-230	230-250	250-270	270-290	290-310	310-330	330-350
No. of workers	4	7	5	9	5	6	4

Draw a frequency polygon.

15. (a) Calculate the mean for the following frequency distribution. (8)

Class interval	0-8	8-16	16-24	24-32	32-40	40-48
Frequency	8	7	16	24	15	7

(b) The arithmetic mean and standard deviation of a series of 20 items were calculated by a student as 20 and 5 respectively. But

while calculating them on item 13 as misread as 30. Find the correct standard deviation. (7)

(OR)

16. (a) In a laboratory experiment on correlation research study, the equations to the regression lines were found to be $2x - y + 1 = 0$ and $3x - 2y + 7 = 0$. For these lines find the means of x and y? Also work out the values of regression coefficient and correlation coefficient between the two variables x and y. (8)

(b) Fit a straight line of Y on X from the following data

X	0	1	2	3	4	5	6
Y	2	1	3	2	4	3	5

17. (a) In a sample of 500 people in Kerala, 280 were tea drinkers and the rest are coffee drinkers. Can we assume that both coffee and tea are equally popular in the state at 1% level of significance? (8)

(b) An I.Q test was administered to 5 persons before and after they have trained. The results are given below

Candidates	1	2	3	4	5
I.Q before training	110	120	123	132	125
I.Q after training	120	118	125	136	121

Test whether there is any change in I.Q level after the training programme.

(OR)

18. (a) The nicotine content in (mg) of 2 samples of tobacco where found to be as follows.

Sample A	24	27	26	21	25	----
Sample B	27	30	28	31	22	36

Can it be said that 2 samples come from normal population having same mean? (8)

(b) A sample of 400 male students is found to have a mean height of 171.38cm. Can it be reasonably regarded as a sample from a large population with mean height of 171.17cm and standard deviation 3.30cm?

PART- C

Answer the following **1 x 20 = 20 Marks**

19. (a) Derive the moment generating function, mean and variance of binomial distribution. (8)

(b) Ten students got the following percentage of marks in Mathematics and Physical Sciences.

Marks in Mathematics	78	36	98	25	75	82	90	62	65	39
Marks in Physical Sciences	84	51	91	60	68	62	86	58	63	47

Calculate the rank correlation coefficient. (12)

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