



NETAJI SUBHAS OPEN UNIVERSITY

POST-GRADUATE COURSE

Assignment — June, 2020

COMMERCE

Paper - XIV : Advanced Statistical Concepts & Tools

QUESTION PAPER CUM ANSWER BOOKLET

(Full Marks : 50)

(Weightage of Marks : 20%)

Special credit will be given for precise and correct answer. Marks will be deducted for spelling mistakes, untidiness and illegible handwriting. The figures in the margin indicate full marks.

Name (in Block Letter) :

Enrolment No.

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Study Centre Name : Code :

To be filled by the Candidate	Serial No. of question answered																
For Evaluator's only	Marks awarded																TOTAL

Q.P. Code : **PA/5/XIV**

PG-COM.-AP-17090

Signature of Evaluator with Date



NETAJI SUBHAS OPEN UNIVERSITY

POST-GRADUATE COURSE

Assignment — June, 2020

COMMERCE

Paper - XIV : Advanced Statistical Concepts & Tools

STUDENT'S COPY

Name (in Block Letter) :

Enrolment No.

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Study Centre Name : Code :

Q.P. Code : **PA/5/XIV**

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Received Answer Booklet
Signature with seal by the Study-Centre

**জরুরি নির্দেশ / Important Instruction**

আগামী শিক্ষাবর্ষান্ত পরীক্ষায় (T.E. Exam.) নতুন ব্যবস্থা অর্থাৎ প্রশ্নসহ উত্তর পুস্তিকা (QPAB) প্রবর্তন করা হবে। এই নতুন ব্যবস্থার সঙ্গে পরীক্ষার্থীদের অভ্যস্ত করার জন্য বর্তমান অনুশীলন পত্রে নির্দেশ অনুযায়ী প্রতিটি প্রশ্নের উত্তর নির্দিষ্ট স্থানেই দিতে হবে।

New system i.e. Question Paper Cum Answer Booklet (QPAB) will be introduced in the coming Term End Examination. To get the candidates acquainted with the new system, assignment answer is to be given in the specified space according to the instructions.

**Detail schedule for submission of assignment for the
PG Term End Examination June-2020**

1. Date of Publication : 20/06/2020
2. Last date of Submission of answer script by the student to the study centre : 19/07/2020
3. Last date of Submission of marks by the examiner to the study centre : 16/08/2020
4. Date of evaluated answer scripts distribution by the study centre to the students (Students are advised to check their assignment marks on the evaluated answer scripts and marks lists in the study centre notice board. If there is any mismatch / any other problems of marks obtained and marks in the list, the students should report to their study centre Co-ordinator on spot for correction. The study centre is advised to send the corrected marks, if any, to the COE office within five days. No change / correction of assignment marks will be accepted after the said five days.) : 23/08/2020
5. Last date of submission of marks by the study centre to the Department of C.O.E. on or before : 31/08/2020

এখানে কিছু লিখবেন না

Do Not Write Anything Here



MODULE - I

Answer any two questions :

$$12 \frac{1}{2} \times 2 = 25$$

1. a) If A and B are two events with $P(B) > 0$, prove that
- $P(A/B) \leq \frac{1 - P(A^C)}{P(B)}$,
 - $P(A/B) = 1 - P(A^C/B)$ and
 - $P(A/B) = \frac{P(A) + P(B) - 1}{P(B)}$. 6
- b) A box contains 25 items of which 5 are defective. An item is selected at random and put into another box which contains 7 defectives out of 25. An item is drawn randomly from the second box. What is the probability that it is defective? 3
- c) Three lots contain respectively 13%, 19% and 25% defective articles. An article is drawn at random from each lot. What is the probability that among them there is (i) exactly one defective, and (ii) at least one defective? $3 \frac{1}{2}$
2. a) A company has 4 production sections : S_1 , S_2 , S_3 and S_4 which contribute 30%, 20%, 28% and 22% respectively to the total output. It was observed that these sections produced 1%, 5%, 2% and 4% defective items respectively. If an item is selected at random and found to be defective, what is the probability that it has come from S_3 ? 7
- b) Compute the value of k if the following function is a p.m.f. or p.d.f. :
- $p(x) = \frac{k}{2x}$, if $x = 1, 2, 3, 4$
 - $f(x) = k\theta e^{-\theta x}$, $x > 0$, θ is a positive constant
 - $p(x) = k \frac{2x}{m(m+1)}$, for $x = 1, 2, 3, \dots, m$. $5 \frac{1}{2}$
3. a) The monthly demand (X) for a particular product has the following probability distribution :
- | | | | | | | | | |
|---------|------|------|------|------|------|------|------|------|
| $X:$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| $P(x):$ | 0.05 | 0.10 | 0.15 | 0.28 | 0.17 | 0.14 | 0.07 | 0.04 |
- Determine the monthly expected demand and its standard deviation. If the cost of producing X items is given by a linear equation $C = 50,000 + 400X$, determine the expected cost and its standard deviation. $6 \frac{1}{2}$
- b) For two discrete random variables
 $E(X) = 80$, $E(Y) = 60$, $V(X) = 110$, $V(Y) = 375$ and $\rho_{xy} = 0.85$.
 Compute the correlation between $U = 5X - 3Y$ and $V = 2X + 7Y$. 6



4. a) The screws manufactured by a certain machine were checked by examining sample of 8 screws. The following frequency distribution gives 200 sample according to number of defective screws they contain. Fit a binomial distribution to the given data and comment.

<i>Defective Screws :</i>	0	1	2	3	4	5	6	7	8
<i>No. of Samples :</i>	2	10	24	38	48	35	25	12	6

 $6\frac{1}{2}$

- b) At a petrol pump, the average quantity of petrol sold to a vehicle is 20 litres per day with an s.d. of 10 litres. If on a particular day, 100 vehicles took 25 or more litres of petrol from the pump, estimate the total number of vehicles which took petrol from the pump on that day.

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First Answer :



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Second Answer :



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MODULE - II

Answer any two questions :

$$12 \frac{1}{2} \times 2 = 25$$

5. a) A random sample of size 4 is drawn from a population consisting of 22 units by the SRSWOR technique. Suppose the sample observations are 6, 8, 13 and 10. Estimate the population mean and its estimated standard error. $6 \frac{1}{2}$

- b) Briefly describe simple random sampling and multistage sampling. 6

6. a) Determine the sample size for estimating the true weight of tea containers :
 i) from a large number of containers
 ii) from 1000 containers so that estimate should be within 10 gms of the true average weight. On the basis of the past records variance is known to be 40 gms. 5

- b) A soft-drink company claims that the content of each of its soft-drink bottle is 300 ml. A consumer suspects that the bottles are underfilled. He measures the contents of 11 bottles which are as follows :

297, 291, 301, 295, 288, 293, 285, 298, 304, 293 and 299

Do you agree that the average content of bottles is really less than 300 ml ? Also obtain 95% confidence interval for the population mean.

(Given $t_{0.05, 10} = 1.812$, $t_{0.01, 10} = 2.764$, $t_{0.025, 10} = 2.228$) $7 \frac{1}{2}$

7. a) Two types of batteries are tested for their length of life and the following data are obtained :

Type of Battery	Sample size	Mean life (hrs)	Variance
A	9	1600	121
B	9	1640	144

Is there a significant difference in the two means ?

(Given $t_{0.025, 16} = 2.120$, $t_{0.005, 16} = 2.921$). 6

- b) 12 students were given intensive coaching and five unit tests were conducted in a month. The scores in 1st and 5th test are given below :

Student	1	2	3	4	5	6	7	8	9	10	11	12
Marks : 1st Test	50	42	51	26	35	42	60	41	70	55	62	38
Marks : 5th Test	62	40	61	35	30	52	68	51	84	63	72	50

Do the data indicate any improvement in the scores obtained in Test 1 and Test 5 ?

(Given $t_{0.05, 11} = 1.796$, $t_{0.01, 11} = 2.718$). $6 \frac{1}{2}$



8. a) In an experiment of breeding of pea seeds Mendel obtained the following frequencies of pea seeds :

Round and yellow : 315

Round and green : 108

Wrinkled and yellow : 101

Wrinkled and green : 32

Mendelian theory states that the respective frequencies should be in the ratio 9 : 3 : 3 : 1.

Are the above data consistent with the Mendelian theory ?

(Given $\chi_{0.05, 3}^2 = 7.815$, $\chi_{0.01, 3}^2 = 11.345$).

$6\frac{1}{2}$

- b) Before an increase in excise duty on tea, 400 people out of 500 were found to be tea drinkers. After an increase in duty 200 people were tea drinkers in a sample of 300 people. State whether there is a significant decrease in consumption of tea. Also obtain the 95% confidence interval for the difference of proportions of tea drinkers.

(Given $z_{0.05} = 1.645$, $z_{0.025} = 1.960$, $z_{0.01} = 2.326$).

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First Answer :



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QP Code : PA/5/XIV

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Second Answer :



QP Code : PA/5/XIV

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QP Code : PA/5/XIV

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