Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: MCA - I
Name of the Paper: Probability and Statistics
Paper Code: TMC 111
Time: 3 hour Maximum Marks: 100

Note:
(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks)(CO1)

a. Define probability. Then solve: From the digits 1, 2, 3, 4, 5 we choose one digit first and then a second digit from the remaining four. All 20 ordered outcomes are equally likely. Find the probability that an odd digit is chosen
(i) on the first draw, (ii) on the second draw, (iii) on both draws.

b. What is random variable? If a pair of dice is rolled, find the probability distribution for getting their sum 2, 3, 4, 5, 6, 7 and 8.

c. Define the following in brief.
(i) Law of expectation,
(ii) Baye's theorem.

Q2. (2X10=20 Marks)(CO2)

a. Define probability density function. If the variable x has the probability density

$$F(x)=\begin{cases} Ke^{-3x} & x>0 \\ 0 & otherwise \end{cases}$$

Find the value of K.

b. Define Geometric distribution and find the formula for 1st and 2nd moment.

c. Define the following in brief.
(i) Binomial distribution,
(ii) Normal distribution.

Q3. (2X10=20 Marks)(CO3)

a. Define the following.
(i) Correlation,
(ii) Regression,
(iii) Karl Pearson's coefficient of correlation,
(iv) Multiple regression.

b. Compute Spearman's rank correlation coefficient r for the following data.

Person	A	B	C	D	E	F	G	H	I	J
Rank in Maths	9	10	6	5	7	2	4	8	1	3
Rank in Physics	1	2	3	4	5	6	7	8	9	10

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c. Find the regression line of y on x and x on y for the following data.

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

Q4. (2X10=20 Marks)(CO4)

a. Define the following.
(i) Population,
(ii) Sample,
(iii) Null hypothesis,
(iv) Test of significance.

b. In a sample of 1000 people, 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular at 1% level of significance. Given that the z value at 1% level of significance for two tailed test is 2.58.

c. Two investigators study the income of group of persons by the method of sampling. Following results were obtained by them. Test whether any investigator is suspected? Given $\chi^2_{0.05}(2) = 5.991$.

Investigator	Poor	Middle Class	Well to do
A	160	30	10
B	140	120	40

Q5. (2X10=20 Marks)(CO5)

a. Define time series and its component. Also calculate the five yearly moving average of the following.

Year	1950	1951	1952	1953	1954	1955	1956
Values	105	115	100	90	80	95	85

b. Fit a trend line to the following data by the least square method and find the production in 1995.

Year	1985	1987	1989	1991	1993
Production	18	21	23	27	16

c. Use the monthly averages to determine the monthly indices for the following data of production of a commodity for the year 2002, 2003, 2004.

Month	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Year 2002	12	11	10	14	15	15	16	13	11	10	12	13
Year 2003	15	14	13	16	16	15	17	12	13	12	13	14
Year 2004	16	15	14	16	15	17	16	13	10	10	11	15