Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2022

Course: Probability and Statistics for Engineers **Semester: III**

Program: B.Tech.-H-CSE-Spz-AI&ML/BAO/BDATA **Time : 03 hrs.**

Course Code: CSEG 2036P **Max. Marks: 100**

Instructions: Attempt all the questions

SECTION A

(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	If two dice are thrown, what is the probability that the sum is (a) greater than 8, and (b) neither 7 nor 11?	**4**	**CO1**
Q 2	Show that the coefficient of correlation r is independent of a change of scale and origin of the variables. Also prove that for two independent variables $r = 0$. Show by an example that the converse is not true.	**4**	**CO5**
Q 3	With the usual notations, find p for a binomial random variable X if $n = 6$ and if $9P(X = 4) = P(X = 2)$.	**4**	**CO2**
Q 4	Each coefficient in the equation $hx^2 + gx + c = 0$ is determined by throwing an ordinary die. Find the probability that the equation will have real roots.	**4**	**CO3**
Q 5	Prove the given statement: If one of the regression coefficients is greater than unity, the other must be less than unity.	**4**	**CO4**

SECTION B

(4Qx10M= 40 Marks)

S. No.		Marks	CO
Q 6	For any three events, A, B and C defined on the sample space S such that $B \subset C$ and $P(A) > 0$ then $P(B\|A) \leq P(C\|A)$.	**10**	**CO1**
Q 7	Show that for $p = 0.50$, the binomial distribution has a maximum probability at $X = \frac{n}{2}$, if n is even, and at $X = \frac{1}{2}(n-1)$ as well as $X = \frac{1}{2}(n+1)$, if n is odd.	**10**	**CO2**
Q 8	Obtain the regression equation of Y on X for the following distribution: $f(x,y) = \frac{y}{(1+x)^4} e^{-\frac{y}{1+x}}$; $x, y \geq 0$.	**3+3+4**	**CO3**
Q 9	X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that a. $26 \leq X \leq 40$ b. $X \geq 45$ c. $\|X - 30\| > 5$.	**10**	**CO3**

SECTION-C (2Qx20M=40 Marks)			
Q 10	In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible: Variance of X = 9. Regression equations: 8X-10Y+66=0, 40X-18Y=214. What were (i) the mean values of X and Y, (ii) the correlation coefficient between X and Y, and (iii) the standard deviation of Y ?	**6+6+8**	**CO5**
Q 11	a. In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution? b. Of a large group of men, 5% are under 60 inches in height and 40% are between 60 and 65 inches. Assuming a normal distribution, find the mean height and standard deviation. **OR** Show that, if a and b are constants and r is the correlation coefficient between X and Y, then the correlation coefficient between aX and bY is equal to r if the signs of a and b are alike, and to $-r$ if they are (different). Also show that, if constants a, b and c are positive, the correlation coefficient between $(aX + bY)$ and cY is equal to $(ar\sigma_X + b\sigma_Y)/(a^2\sigma_X^2 + b^2\sigma_Y^2 + 2abr\sigma_X\sigma_Y)^{\frac{1}{2}}$.	**10+10** **OR** **10+10**	**CO4** **OR** **CO4**