

# Techno NJR Institute of Technology



## Course File

### Advance Engineering Mathematics-II

**(4CE2-01)**

Year: 23-24

Dr Rekha Lahoti

(Professor)

**Department of Basic Science**

E-mail id: [rekha.lahoti@technonjr.org](mailto:rekha.lahoti@technonjr.org)

**Total Number of Lectures:** 42

i) **Course Objective:** Students should be able to understand the Probability and solve the Discrete and Random variables, conditional probability mean variance expectation and all type of distributions using in day to day life problems. Also understand test of significance on large sample data by various ways.

## INDEX - COURSE FILE

S. No.	CONTENT / ITEM NO.	PAGE NO.	Status
1	Vision And Mission Of The Institute		
2	Vision And Mission Of The Department		
3	Program Educational Objective Of Department (PEO's)		
4	Program Outcomes Of Department (PO's)		
5	Outcome (COs)		
6	Mapping with Pos and PSOs		
7	Academic Calendar		
8	Evaluation Scheme		
9	Course Syllabus		
10	Prescribed Books		
11	Copy Of Time Table		
12	Course Schedule Plan		
13	Assignment Sheet		
14	Quiz Questions		
15	Question Papers Of Mid Term Exam-I		
16	Marks and Gap Analysis in Mid Term I		
17	Remedial Action Taken To Remove the Gaps after mid Term I		
18	Question Papers Of Mid Term Exam-II		
19	Gap Analysis in Mid Term II		
20	Remedial Action Taken To Remove the Gaps after mid Term II		
21	University Question Paper /Model paper (Last one year)		
22	Student Performance Report		
23	Result Analysis		

## VISION & MISSION OF INSTITUTE

### *Vision*

Empowering student with recent and emerging technologies to create innovative technical leaders capable of contributing to industrial and societal needs for betterment of mankind across the globe.

### *Mission*

**M1:** To provide dynamic learning environment to students by providing constant exposure to latest technologies by linking closely with the industries.

**M2:** To establish effective interface with industry to obtain live problems to enhance critical thinking and problem solving skills among students and consultancy projects for faculty.

**M3:** To provide avenues and opportunities to faculty for domain specific trainings and qualification upgradation.

**M4:** To develop ethical leaders with strong communication skills.

## VISION & MISSION OF DEPARTMENT

### Department Vision

To increase students learning of fundamentals for designing and planning of buildings and latest technologies through industry-aligned project-based learning which will help in transforming students to be good civil engineering professionals leading to innovation and incubation of new ideas.

### Department Mission

M1:	To create experimental learning through solving problems of Government, Society, Smart Cities, Industry and other entities.
M2:	To teach the latest technologies to the students as beyond the syllabus activity so that they are updated and industry ready.
M3:	To enable engineering students understand industry-aligned technologies and learn to find solutions from their early engineering days and this is the only way to produce globally relevant engineers solving real-life problems applying current technologies.
M4:	To enable students to generate projects through problem faced by and requirement of Smart cities, industry, Government and other entities whereby those outlined problem statements are to be studied deeply by a group of faculty members to convert them into real-time project format.

## PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1	Engineering knowledge:	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis:	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions:	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems:	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern tool usage:	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with and understanding of the limitations.
6	The engineer and society:	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability:	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8	Ethics:	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work:	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication:	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance:	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long learning:	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PROGRAM SPECIFIC OUTCOMES (PSOs)**

<b>PSO1:</b>	To be aware of and initiate some-work on future technologies and new developments which may impact the future Industry 4.0.
<b>PSO2:</b>	Hands on training on upcoming technologies and project-based learning.
<b>PSO3:</b>	Get exposure to BIM (Building Information Modelling).

## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

<b>PEOs 1</b>	To provide an in-depth understanding of the fundamentals of Civil Engineering and create a foundation for lifelong learning to facilitate a progressive career in the construction Industry, as an entrepreneur and in pursuit of higher studies.
<b>PEOs 2</b>	To equip the students with technical and analytical skills to develop innovative solutions to complex real-life problems using existing and novel technologies. To equip the students with good communication and interpersonal skills, inter-disciplinary teamwork and leadership skills to enable them to fulfil professional responsibilities.
<b>PEOs 3</b>	To expose them to various contemporary issues which will enable them to become ethical and responsible towards themselves, co-workers, Society and the Nation.
<b>PEOs 4</b>	To make the student's industry ready by imparting education related to the latest technologies so that they can grab future industry jobs.

## COURSE OUTCOMES (COs) OF THE SUBJECT

CO NO	COGNITIVE LEVEL	CO
4CE2-01.1	Analysis	Students will be able to apply concepts of probability.
4CE2-01.2	Analysis	Students will be able to use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions
4CE2-01.3	Analysis	Students will be able to apply different probability distribution to identify and solve real life problem.
4CE2-01.4	Analysis	Students will be able to analyze the pair of variables are related or not, and predict the future value by using the regression equations.
4CE2-01.5	Analysis	Students use the statistical test to develop a better management system and provide good services or results in their future life journey

### Course Outcome Mapping with Program Outcome:

ADVANCE ENGINEERING MATHEMATICS-II																
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO241.1	2	2	0	1	1	0	0	0	0	0	0	1	0	0	0	
CO241.2	2	2	0	1	1	0	0	0	0	0	0	1	0	0	0	
CO241.3	2	2	0	1	1	0	0	0	0	0	0	1	0	0	0	
CO241.4	2	2	0	1	1	0	0	0	0	0	0	1	0	0	0	
CO241.5	2	2	0	1	1	0	0	0	0	0	0	1	0	0	0	
CO241 (AVG)	2	2	0	1	1	0	0	0	0	0	0	1	0	0	0	

1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)



## Academic Calendar –(23-24) Odd Sem

Notice regarding amendment in period of practical training for B.Tech. IV & VI Semester classes

### RAJASTHAN TECHNICAL UNIVERSITY KOTA

Course: Bachelor of Technology (B.TECH.) for Odd Semester				
Semester	I	III	V	VII
Induction Program	17.08.2023			
Commencement of Classes	11.09.2023	24.08.2023	04.09.2023	04.09.2023
Commencement of First Mid Term	02.11.2023	03.10.2023	05.10.2023	05.10.2023
Commencement of Second Mid Term	07.12.2023	16.11.2023	20.11.2023	20.11.2023
Last Working Day	23.12.2023	02.12.2023	02.12.2023	30.11.2023
Commencement of Practical Exams	02.01.2024	04.12.2023	23.12.2023	14.12.2023
Commencement of Theory Exams	18.01.2024	14.12.2023	08.12.2023	07.12.2023
Winter Break				

## Academic Calendar –(23-24) EVEN SEM

### RAJASTHAN TECHNICAL UNIVERSITY KOTA

Course: Bachelor of Technology (B.TECH.)

Course: Bachelor of Technology (B.TECH.)				
Semester	II	IV	VI	VIII
Commencement of Classes	26.02.2024	15.02.2024	15.02.2024	02.01.2024
First Mid Term	02.04.2024	20.03.2024	20.03.2024	15.02.2024
Second Mid Term	03.06.2024	06.05.2024	06.05.2024	21.03.2024
Last Working Day	10.06.2024	31.05.2024	31.05.2024	20.04.2024
Commencement of Practical Exams	01.07.2024	03.06.2024	03.06.2024	22.04.2024
Commencement of Theory Exams	19.06.2024	14.06.2024	15.06.2024	02.05.2024
Project (VIII)				
Practical Training (After II Sem.)	15.07.2024 To 31.07.2024			
Practical Training (After IV Sem.)	01.07.2024 To 17.08.2024			
Practical Training (After VI Sem.)	01.07.2024 To 17.08.2024			

## Evaluation Scheme

FACULTY DETAILS:

Name of the Faculty : Dr Rekha Lahoti  
Designation : Professor  
Department : Civil Department

1. TARGET

a) Percentage Pass : 100%  
b) Percentage I class: 60 %

2. METHOD OF EVALUATION

- 2.1. Continuous Assessment Examinations  
(Mid-Term 1, Mid-Term 2)
- 2.2. Assignments / Seminars
- 2.3. Mini Projects
- 2.4. Quiz
- 2.5. Semester Examination
- Others \_\_\_\_\_

3. List out any new topic(s) or any innovation you would like to introduce in teaching the subject in this Semester.  
1. Take the help of creative tools to stimulate creativity. Include slide presentations, demonstration or forms of visual exercises that will excite the young minds and capture their interest.

Signature of Faculty:

**Signature of HOD**



# RAJASTHAN TECHNICAL UNIVERSITY, KOTA

## SYLLABUS

II Year-IV Semester: B.Tech. (Civil Engineering)

### 4CE2-01: ADVANCE ENGINEERING MATHEMATICS-II

Credit: 2  
2L+0T+0P

Max. Marks: 100 (IA:20, ETE:80)  
End Term Exam: 2 Hours

SN	CONTENTS	Hrs.
1	<b>Introduction:</b> Objective, scope and outcome of the course.	1
2	<b>Probability:</b> Basic concepts of probability, conditional probability, Baye's theorem. Random variable: Discrete and Continuous random variables, Joint distribution, Marginal distribution, Probability distribution function, Conditional distribution. Mathematical Expectations: Moments, Moment Generating Functions, variance and correlation coefficients, Chebyshev's Inequality, Skewness and Kurtosis. Binomial, Poisson and Normal distribution and their properties.	13
3	<b>Applied Statistics:</b> Basic concept of variance, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.	12
<b>Total</b>		<b>26</b>

## PRESCRIBED BOOKS

1. Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publications.
2. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley.
4. Advanced Engineering Mathematics, Gokharoo & Mehta, Unique book

## WEEKLY TIME TABLE OF THE TEACHER

First Time Table: with effect from (Date): 10/4/23

Day	1	2	3	4	5	6	7
Monday	II CE						
Tuesday			II CE				
Wednesday							
Thursday	II CE						
Friday			II CE				
Saturday							

Revision: 1 with effect from (Date):

Day	1	2	3	4	5	6	7
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							

Unit	Lecture No.	Topic
01	1.	Introduction
	2.	Probability & Conditional Probability
	3.	Numericals on probability
	4.	Baye's theorem
	5.	Random variable
	6.	Discrete and continuous random variables
	7.	Joint distributaion and Marginal distribution
	8.	Probability distribution and Conditional distribution

	9.	Numericals
02	10.	Mathematical expectations
	11.	Moments, Moment generating functions
	12.	Numericals
	13.	Chebyshev's Inequality
	14.	Skewness and Kurtosis
03	15.	Binomial Distribution
	16.	Numericals
	17.	Poisson probability distribution
	18.	Numericals
	19.	Normal Probability distribution
	20.	Numericals
04	21.	Variance
	22.	correlation coefficients
	23.	Regression
	24.	Rank correlation
	25.	Numerical
	26.	Curve fitting by the least square
	27.	Fitting by the straight lines
	28.	Second degree parabolas and more curves
	29.	Numerical
05	30.	Introduction test of significance
	31.	Large sample test for single proportion
	32.	Numerical
	33.	Difference of proportions
	34.	Numerical
	35.	Single mean
	36.	Numerical
	37.	Difference of means
	38.	Numerical
	39.	Difference of standard deviations
	40.	Numerical

## Teaching and Learning resources unit-wise

### **Unit-1**

<https://youtu.be/b5VUnapu-qshttps://youtu.be/flUk8zwqGV0>

### **Unit-2**

[https://youtu.be/FL6thjKSR58?list=PLNKx0RorxX44HBsItvZP5CzFX1qCQOwp5https://youtu.be/JOfnCCNj4gQ?list=PLYqSpQzTE6M\\_fDgY78f51AT5zR6xHAaj](https://youtu.be/FL6thjKSR58?list=PLNKx0RorxX44HBsItvZP5CzFX1qCQOwp5https://youtu.be/JOfnCCNj4gQ?list=PLYqSpQzTE6M_fDgY78f51AT5zR6xHAaj)

### **Unit-3**

<https://www.youtube.com/watch?v=o77UV7YrWvwhttps://youtu.be/GNdxE5wWth0>

### **Unit-**

[4https://youtu.be/GG9zaveXNe](https://youtu.be/GG9zaveXNe4k)

[k](https://www.youtube.com/watch?v=LNrd5VslI2k)

[https://www.youtube.com/watch?v=LNrd5VslI2](https://www.youtube.com/watch?v=LNrd5VslI2k)

### **Unit-5**

<https://youtu.be/5YspFqUYXa4>

<https://youtu.be/zADj0k0waFY>



## QUIZ QUESTIONS

(Unit-Wise)

1	Define discrete random variable and continuous random variable with example
2	Define joint and marginal distribution.
3	Write karlpearson $\beta$ and $\gamma$ coefficients.
4	Define Skewness and Kurtosis with example
5	Write the statement of principle of least squares
6	Define the test of significance for difference of two means of two large samples.
7	Write the standard form of Normal distribution.
8	Write the statement of principle of least squares
9	Define the test of significance for difference of two means of two large samples.
10	Write the mean and variance of Binomial distribution
11	Define discrete random variable and continuous random variable with example
12	Write the standard form of Normal distribution.
13	Write the statement of principle of least squares
14	Define the test of significance for difference of two means of two large samples.
15	State the Baye's Theorem..



**4E1206**

Roll No. \_\_\_\_\_

Total No of Pages: **3**

**4E1206**  
**B. Tech. IV-Sem. (Back) Exam., Oct.-Nov. - 2020**  
**HSMC Agriculture Engineering**  
**4AG2 - 01 Advanced Engineering Mathematics – II**  
**AG, CE, MI**

**Time: 2 Hours****Maximum Marks: 65**  
**Min. Passing Marks: 23***Instructions to Candidates:*

*Attempt all five questions from Part A, four questions out of six questions from Part B and one questions out of three from Part C.*

*Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL \_\_\_\_\_ 2. NIL \_\_\_\_\_

**PART – A**

**(Answer should be given up to 25 words only) [5×2=10]**

**All questions are compulsory**

- Q.1 State the Bayes' Theorem.  
Q.2 Define the Marginal and Conditional distribution.  
Q.3 Define the Skewness and Kurtosis.  
Q.4 State the angle between two lines of regression. Also Interpret the case  $r = 0$ ,  $r = \pm 1$ .  
Q.5 Write the test of significance of single mean.

[4E1206]

Page 1 of 3

[2380]

**Part – B**

**(Analytical/Problem solving questions)**

**[4×10=40]**

**Attempt any four questions**

Q.1 Obtain the rank correlation for the following data –

x : 81 78 79 73 69 68 62 58

y : 10 12 18 18 18 20 20 24

Q.2 State and prove the Chebyshev's Inequality.

Q.3 There are three boxes containing respectively 1 white, 2 red and 3 black balls; 2 white, 3 red and 1 black balls; 3 white, 1 Red, and 2 black balls. A box is chosen at random and from it two balls are drawn at random, which are 1 red and 1 white. Find the probability that these come from -

- (a) The first box
- (b) The second box
- (c) The third box

Q.4 Define the curve fitting by the Method of least squares. Also fit a straight line to the following data. <http://www.rtuonline.com>

(x, y) : (0, 1) (1, 1.8) (2, 3.3) (3, 4.5) (4, 6.3)

Q.5 Fit a Binomial distribution to the following set of observations –

Variety (x): 0 1 2 3 4 5

Frequency (f): 10 20 25 20 17 8

Q.6 A sample of 400 male students is found to have a mean height of 168.67 cm. Can it be reasonable regarded as a sample from large population with mean height 168.47 cm. and SD 3.25 cm.

**PART - C**

**(Descriptive/Analytical/Problem Solving/Design Questions)** [1×15=15]

**Attempt any one questions**

Q.1 Two random variable X and Y have the following Joint Probability density function.

$$f(x,y) = \begin{cases} 2-x-y; & 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

Find-

- (a) Marginal Probability density function of X and Y
  - (b) Conditional density function
  - (c) Var (X) and Var (Y)
  - (d) Covariance between X and Y
- Q.2 (a) Prove Poisson distribution as a limiting case of Binomial distribution.
- (b) In a Normal distribution 31% of the item are under 45 and 8% are over 64. Find the parameters of the distribution.
- Q.3 (a) if X is a Random Variate, then Prove that
- (i)  $E(X^2) \geq [E(X)]^2$
  - (ii)  $|E(X)| \leq E|X|$
- (b) Sample of size 10 and 12 taken from two normal population gave  $S_1 = 12$  and  $S_2 = 18$ . Test the Hypothesis  $\sigma_1 = \sigma_2$ .
-

**4E1313**

Roll No. \_\_\_\_\_

Total No. of Pages: **4**

**4E1313**  
**B. Tech. IV - Sem. (Main) Exam., - 2022**  
**Civil Engineering**  
**4CE2 – 01 Advance Engineering Mathematics - II**  
**AG, CE, MI**

Time: 3 Hours

Maximum Marks: 70

*Instructions to Candidates:*

*Attempt all ten questions from Part A. Five questions out of seven questions from Part B and three questions out of five from Part C.*

*Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 A card is drawn from a well – shuffled pack of playing cards. What is the probability that it is either a spade or an ace?
- Q.2 When A and B are two mutually exclusive events such that  $P(A) = 1/2$  and  $P(B) = 1/3$ , find  $P(A \cup B)$  and  $P(A \cap B)$ .
- Q.3 If X and Y are two random variables such that  $E(X) = 3$  and  $E(Y) = 5$ , then what will be the value of  $E(2X + 4Y)$ ?

- Q.4 Write the Chebyshev's Inequality.
- Q.5 If mean of Poisson distribution is 3, then what is the value of variance?
- Q.6 What type of correlation exists when the values of two variables move in the same direction?
- Q.7 If  $r = 0.8$  and  $b_{xy} = 0.32$ , then what will be the value of  $b_{yx}$ ?
- Q.8 If  $y = 2x + 10$  is the best fit for 10 pairs of values  $(x, y)$ , by least square method and  $\sum y = 200$ ; then find the value of  $\sum x$ .
- Q.9 Which distribution is useful for large sample while testing for population means?
- Q.10 What is the meaning of the testing of the hypothesis?

### PART – B

(Analytical/Problem solving questions)

[5×4=20]

Attempt any five questions (Word limit 100)

- Q.1 In a bolt factory machines A, B and C manufactures respectively 25%, 35% and 40% of the total. Of their output 5, 4, 2 percentages are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the chance that it was manufactured by machine C?
- Q.2 A continuous random variable has the probability density function  $f(x) = kx^2e^{-x}$ ,  $x \geq 0$ . Find its second moment about mean. <https://www.rtuonline.com>
- Q.3 A perfect cubical die is thrown a large number of times in sets of 8. The occurrence of 5 and 6 is called a success. In which proportion of the sets you expect 3 successes.
- Q.4 If  $P(X = 2) = 9P(X = 4) + 90P(X = 6)$  in the Poisson distribution then find its mean, variance and standard deviation.





## TUTORIAL SHEETS

### (Chapter wise)

#### TUTORIAL CHAPTER –I (CO242-01.1)

**Subject (with Code):** Advanced Engineering Mathematics (4CE2-01) **Year/Sem:** II/IV

- Q.1 A coin is tossed until a head appears, what is the expectation of the number of tosses required?
- Q.2 In a sample of 10 pens . If 10 % of the pens produced by a company are defective .Find out the probability that
- (i) No pen must be defective
  - (ii) One must be defective
  - (iii) At least two must be defective
- Q.3 Two card are drawn successively with replacement from a well shuffled pack of 52 cards, find the mean and the variance of number of aces.

#### TUTORIAL CHAPTER-II(CO242-01.2)

**Subject (with Code):** Advanced Engineering Mathematics (4CE2-01) **Year/Sem:** II/IV

Q.1 A factory produces razor blades, the probability of its being defective is 0.002 . the blades are supplied in packets of 10. Using Poisson distribution , find number of packets containing no defective blades , one defective blade and Two defective blades respectively in a consignment of 10,000 packets .

(Given  $e^{-0.02} = 0.9802$ )

**Q.2** Let X be random variable with the following probability distribution, Find  $E(X)$ ,  $E(X^2)$ ,  $E(2X+1)$

X	-3	6	9
Y	1/6	1/2	1/3

Q.3 Solve  $y^2 \log \log y = p^2 + xyp$



TUTORIAL CHAPTER –III(CO242-01.3)

**Subject (with Code):** Advanced Engineering Mathematics (4CE2-01) **Year/Sem:** II/IV

**Ques 1** On a telephone booth arrival of customers follows Poisson process with an average time of 10 minutes between one arrival and next arrival. The length of a phone call is assumed to be distributed exponentially with mean 3 minutes.

- (i) Find the average number of persons waiting in the system.
- (ii) What is the probability that he spent more than 10 minutes in the booth?
- (iii) What is the probability that a person arriving at the booth will have to wait?
- (iv) Find the fraction of the days when the phone will be used.

**Ques 2** The distribution of weekly wages for 500 workers in a factory is approximately normal with mean and standard deviation of Rs. 75 and Rs. 15. Find the number of workers who receive weekly wages (i) more than Rs.90 (ii) less than Rs.45.[Given  $P(0 < z < 1) = 0.1587$ ,  $P(0 < z < 2) = 0.0228$ ,  $P(0 < z < 3) = 0.4987$ ]

**Ques 3** If the height of 300 student are normally distributed with mean 64.5 inches and standard deviation 3.3 inches , how many students have height (i) less than 5 feet , (ii) between 5 feet and 5 feet 9 inches. Also find the height between which 99% of the student lie.

TUTORIAL  
CHAPTER –IV(CO242-01.4)

**Subject (with Code):** Advanced Engineering Mathematics (4CE2-01) **Year/Sem:** II/IV

Date : 26 March 2020

**Ques 1** Calculate the karlpearson coefficient of correlation between x and y. From the following data:

X :	17	18	19	19	20	20	21	21	22	23
Y :	12	16	14	11	15	19	22	16	15	20

**Ques 2** Ten competitors in beauty contest got marks by three judges in the following orders

use the rank correlation coefficient to discuss which pair of judges have the nearest approach to common tastes in beauty.

1 <sup>st</sup> judge	1	6	5	10	3	2	4	9	7	8
2 <sup>nd</sup> judge	6	4	9	8	1	2	3	10	5	7
3 <sup>rd</sup> judge	3	5	8	4	7	10	2	1	6	9

**Ques 3** Derive the equations of the lines of regression.

TUTORIAL CHAPTER –V(CO242-01.5)

**Subject (with Code):** Advanced Engineering Mathematics (4CE2-01) **Year/Sem:** II/IV

Date : 5 April 2020

Q.1 A machine produces 16 defective articles in a batch of 500. After overhauling it produced 3 defective in a batch of 100. Has the machine improved?

Q.2 A person throws 10 dice 500 times and obtains 2560 times 4,5 or 6. Can this be attributed to fluctuation of sampling?

Q.3 In a hospital 480 female and 520 male babies were born in a week. Does this figure confirm the hypothesis that male and female is born in equal number?

# ASSIGNMENT

(Chapter wise)

## B.Tech. IV Semester (Branch –CE)

ASSIGNMENT-I(CO242-01.1, CO242-01.2)

Subject Code/ Name: 4CE2-01 /AD ENGG. MATHEMATICS II Year/Sem: 2<sup>nd</sup> / IV

### Section - A

Q.1 State Addition law of probability

Q.2 If two event are independent and  $P(A)=1/3$  , $P(B)=3/4$  Find  $P\left(\frac{A}{A \cup B}\right)$ .

Q.3 Define the random variable with suitable example.

Q.4 The probability distribution of a random variable X is given by :-

X	0	1	2
P(X=x)	$3C^3$	$4C - 10C^2$	$5C - 1$

Find the value of C.

Q.5 If the joint pdf of (X,Y) is given by:

$$f(x,y) \begin{cases} 2 & , 0 < x < 1, 0 < y < x \\ 0 & , otherwise \end{cases}$$

Find the marginal density function of X and Y.

Q.6 Define Skewness and Kurtosis.

Q.7 If X is the number of point rolled with a balanced die. Find the expected value of  $G(X) = 2X^2 + 1$ .

### Section – B

Q.1 A box contains 3 blue and 2 red marbles while another box contain 2 blue and 5 red marbles . A marble drawn at random from one of the boxes turns up to blue . Find the probability that it came from (i) first box (ii) second box .

Q.2 A and B take turn in throwing of two dice, the first to throw 9 will be awarded a prize. If A has the first turn , Show that their chances of winning are in the ratio 9:8 .

Q.3 State and prove the Baye's Theorem.

Q.4 The odds that a book will be reviewed favourably by three independent critics are 5 to 2 , 4 to 3 and 3 to 4 . What is the probability that of the three reviews, a majority will be favourable .

Q.5 A random variable x has the following probability distribution

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) Determine distribution function of x .

(iii) Find  $P\left(\frac{1.5 < x < 4.5}{x > 2}\right)$

Q.6 Given the joint probability density  $f(x,y) = \frac{2}{3}(x + 2y)$  ,  $0 < x < 1, 0 < y < 1$  , 0 , elsewhere . Find

(i) Marginal density of X and Y

(ii) Conditional density of X given  $Y = y$  and use it to evaluate  $P\left\{\frac{X \leq \frac{1}{2}}{Y = \frac{1}{2}}\right\}$

Q.7 The first four moments of the distribution about the value 4 of the variable are -1.5, 17 , -30 and 108.

Find the mean , variance ,  $\beta_1$  and  $\beta_2$  . Comment upon the nature of distribution.

Q.8 Thirteen cards are drawn simultaneously from a deck of 52. If aces count 1, face cards 10 and others according to denomination. find the expectation of the total score on 13 cards.

**Section – C**

Q.9 (a) For a frequency distribution the mean is 1.5, variance = 0.64,  $\beta_2=2.5$  and  $\mu_1 = 0.3$  find  $\mu_3, \mu_4$  and first four moment about the origin.

(b) A random variable  $x$  assume the value  $r$  with the probability,  $(x = r) = q^{r-1}p, r=1,2,3,\dots$

Find the moment generating function and hence the mean and the variance.

Q.10(a) A random variable  $x$  has the probability density

$$f(x) = \begin{cases} 0, & x < 0 \\ Ke^{-2x}, & x > 0 \end{cases} \text{ Find}$$

(i)  $K$  (ii)  $P(x > 5)$  (iii)  $P(1 < x < 3)$  (iv) The distribution function of  $F(x)$ .

(b) From a lot of 25 items, containing 5 defective, a sample of 4 items was drawn at random (i) without replacement (ii) with replacement. Find the expected value of the number of defective items in drawn sample.

Q.11 For a certain binary communication channel, the probability that a transmitted '0' is received as '0' is 0.95 and the probability that a transmitted '1' is received as '1' is 0.90. If the probability that a '0' is transmitted is 0.4, find the probability that

(i) a '1' is received.

(ii) a '1' is transmitted given that a '1' is received.

Q.12 Two balls are selected at random from a box containing two red, three white and four blue balls. let  $(x,y)$  be a bivariable random where  $x$  and  $y$  denote the number of red and white ball chosen-

(i) Find the joint probability mass function of  $(x,y)$

(ii) Find marginal probability mass function of  $x$  and  $y$ .

(iii) Conditional distribution of  $x$  given  $y=1$ .

## Section - A

- Q.1 Define Binomial Probability Distribution.  
 Q.2 Define Poisson Probability Distribution  
 Q.3 Define Normal Probability Distribution.

## Section – B

Q.1 fit a Poisson distribution to the following data which gives the number of dodders in a sample of clover seeds:

No. of Dodders(x )	0	1	2	3	4	5	6	7	8
Observed Frequency	56	156	132	92	37	22	4	0	1

Q.2 In a sample of 10 pens . If 10 % of the pens produced by a company are defective .Find out the probability that

- (iv) No pen must be defective  
 (v) One must be defective  
 (vi) At least two must be defective.

Q.3 Prove that Poisson distribution is the limiting case of Binomial distribution.

Q.4 The distribution of weekly wages for 500 workers in a factory is approximately normal with mean and standard deviation of Rs. 75 and Rs. 15. Find the number of workers who receive weekly wages (i) more than Rs.90 (ii) less than Rs.45.

[Given  $P(0 < z < 1) = 0.3413$ ,  $P(0 < z < 2) = 0.4772$ ,  $P(0 < z < 3) = 0.4987$ ]

Q.5 If the height of 300 student are normally distributed with mean 64.5 inches and standard deviation 3.3 inches. How many students have height (i) less then 5 feet (ii) between 5 feet and 5 feet 9 inches . Also find the height between which 99% of student lie . [ Given  $P(0 < z < 1) = 0.3413$  ,  $P(0 < z < 1.36) = 0.4131$  ,  $P(0 < z < 2.33) = 0.49$  ,  $P(0 < z < 2.57) = 0.495$  ].

Q.6 A factory produces razor blades, the probability of its being defective is 0.002 . the blades are supplied in packets of 10. Using Poisson distribution , find number of packets containing no defective blades , one defective blade and Two defective blades respectively in a consignment of 10,000 packets . (Given  $e^{-0.02} = 0.9802$ )

Q.7 Find mean and variance of Binomial distribution

Q.8 Find the recurrence relation for the central moment of the binomial distribution. By the help of this find first three central moments.

Q.9 Out of 800 families with 4 children each , how many families would be expected to have (i) 2 boys and 2 girls (ii) at least one boy (iii) no girls (iv) at most 2 girls . Assume equal probabilities for boys and girls .

Q.10 If skulls are classified as A,B,C according as the length , breath index as under 75, between 75 and 80 , or over 80, find the mean and standard deviation of the classes in which A are 58% ,B are 38% and C are 4% . (Given  $\Phi(0.20) = 0.08$  and  $\Phi(1.75) = 0.46$  from the area table)

Q.11 A car hire has two cars which it hires out day by day, The number of demands for a car on each day is distributed as Poisson variant with mean 1.5 . Calculate the proportion of days on which (i) neither car is used (II) Some demand is refused.

Q.12 Find mean and variance of Normal distribution

**Section - A**

- Q.1 Define Correlation with suitable examples.
- Q.2 Define (i) Curve fitting (ii) Principle of Least Squares.
- Q.3 Write the Equation of two lines of regression.
- Q.4 Write the normal equations of fitting of parabola.

**Section - B**

Q.1 Calculate the karlpearson coefficient of correlation between x and y. From the following data:

X :	17	18	19	19	20	20	21	21	22	23
Y :	12	16	14	11	15	19	22	16	15	20

Q.2 Calculate the correlation coefficient for the following height (in inches) of father(X) and their son (Y)

X:	65	66	67	67	68	69	70	72
Y:	67	68	65	68	72	72	69	71

Q.2 Ten competitors in beauty contest got marks by three judges in the following orders:

1 <sup>st</sup> judge	1	6	5	10	3	2	4	9	7	8
2 <sup>nd</sup> judge	6	4	9	8	1	2	3	10	5	7
3 <sup>rd</sup> judge	3	5	8	4	7	10	2	1	6	9

Use the rank correlation coefficient to discuss which pair of judges have the nearest approach to common tastes in beauty.

Q. 3 Show that  $\theta$  , the acute angle between the two lines of regression is given by

$$\tan \theta = \left( \frac{1-r^2}{r} \right) \left( \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \right) . \text{ Interprets the case when } r = 0, \pm 1$$

Q. 4 In a partially destroyed laboratory record of analysis of correlation data , the following results are legible ; Variance of x = 9 , regression equation :  $8x - 10y + 66 = 0$  ,  $40x - 18y = 214$  find :

- (i) The mean value of x and y
- (ii) The standard deviation of y and
- (iii) Coefficient of correlation between x and y .

Q. 5 Fit a straight line to the following data:

X	1	2	3	4	6	8
Y	2.4	3.0	3.6	4.0	5.0	6.0

Q.6 calculates the coefficient of correlation and obtain the line of regression for the following data.

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

Obtain also an estimate for y which should correspond on an average to x = 6.2

Q.7 Fit a parabola of second degree to the following data

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

Q.8 Find the two lines of regression and coefficient of correlation for the data given below.

$$n = 18, \Sigma x = 12, \Sigma y = 18, \Sigma x^2 = 60, \Sigma y^2 = 96, \Sigma xy = 48.$$

Q.9 Find the most likely price in Bombay corresponding to the price of Rs.70 at Calcutta from the following:

	Calcutta	Bombay
Average price	65	67
Standard deviation	2.5	3.5

Q.10 Prove that the correlation coefficient lies between -1 and 1.

Q.11 Derive the equations of the lines of regression.

Q.12 Lines  $2x + 3y = 10$  and  $4x + 5y = 18$  are lines of regression between two variables  $x$  and  $y$ . Decide which one is the lines of regression of  $x$  on  $y$ . Given  $x = 5$ , find  $y$  and also find mean values of variables.

## ASSIGNMENT-V(CO242-01.5)

Subject Code/ Name: 4CE2-01 / AD ENGG. MATHEMATICS II      Year/Sem: 2<sup>nd</sup> / IV

### Section – A

Q.1 Define statistical Inference.

Q.2 Explain Hypothesis Testing and Estimation.

Q.3 What is the meaning of significance level.

Q.4 Define Null and Alternate Hypothesis.

### Section – B

Q.5 A coin is tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.

Q.6 A wholesaler in apples claims that only 4% of the apples supplied by him are defective. A random sample of 600 apples contained 36 defective apples. Test the claim of the wholesaler.

Q.7 A machine produces 16 defective articles in a batch of 500. After overhauling it produced 3 defective in a batch of 100. Has the machine improved?

Q.8 Two samples of 100 Electric bulbs each has a means 1500 and 1550, Standard deviation 50 and 60. Can it be concluded that brands differ significantly at 1% level of significance in equality.

Q.9 A sample of 100 tyres is taken from a lot. The mean life of tyres is found to be 39,350 kms. With a standard deviation of 3260. Could the sample from a population with mean life of 40,000 kms? Established 99% confidence limit within which the mean life of tyres is expected to lie.

Q.10 In a sample of 1000 the mean is 17.5 and the s.d.2.5. In another sample of 800 the mean is 18 and s.d.2.7. Assuming that the samples are independent, discuss whether the two samples can have come from a population which have the same s.d.

Q11 A Coin is tossed 900 times and head appeared 490 times. Would you conclude that the coin is biased one?





## Mid Term -I

TECHNO INDIA NJJR INSTITUTE OF TECHNICAL STUDIES, UDAIPUR

I Internal Examination

B. Tech II Year, IV Semester

Sub: Advance Engineering Mathematics-II (Code: 4CE2-01)

Time: 2 Hr

Max Marks: 70

Q. No.	Question	Marks	CO																	
<b>PART-A</b>																				
Q.1 (a)	If two event are independent and $P(A)=1/3, P(B)=3/4$ Find $P\left(\frac{A}{A \cup B}\right)$	<b>4*2</b>	CO242-01.1 CO242-01.1																	
(b)	.State Baye's Theorem																			
(c)	If the joint pdf of (X,Y) is given by: $f(x,y) \begin{cases} 2 & , 0 < x < 1, 0 < y < x \\ 0 & , otherwise \end{cases}$ Find the marginal density function of X and Y		CO242-01.2																	
(d)	Define Binomial distribution.		CO242-01.2																	
<b>PART-B</b>																				
Q.2	A and B take turn in throwing of two dice, the first to throw 9 will be awarded a prize. If A has the first turn, Show that their chances of winning are in the ratio 9:8 OR In a bolt factory machines A, B and C manufacture respectively 25%, 35% and 40% of the total bolts. Of their output 5, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the product and is found to be defective, what is probability that it was manufactured by machine A, B and C?	<b>2*5</b>	CO242-01.1																	
Q.3	A random variable x has the following probability distribution <table border="1" style="margin-left: 20px; border-collapse: collapse;"> <tr> <td style="padding: 2px;">X :</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">2</td> <td style="padding: 2px;">3</td> <td style="padding: 2px;">4</td> <td style="padding: 2px;">5</td> <td style="padding: 2px;">6</td> <td style="padding: 2px;">7</td> </tr> <tr> <td style="padding: 2px;">P(x) :</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">K</td> <td style="padding: 2px;">2k</td> <td style="padding: 2px;">2k</td> <td style="padding: 2px;">3k</td> <td style="padding: 2px;">k<sup>2</sup></td> <td style="padding: 2px;">2k<sup>2</sup></td> <td style="padding: 2px;">7k<sup>2</sup> + k</td> </tr> </table> (i) Find k (ii) Determine distribution function of x. (iii) Find $P\left(\frac{1.5 < x < 4.5}{x > 2}\right)$ OR Given the joint probability density $f(x,y) = \begin{cases} \frac{2}{3}(x+2y) & , 0 < x < 1, 0 < y < 1 \\ 0 & , elsewhere \end{cases}$ . Find (i) Marginal density of X and Y (ii) Conditional density of X given $Y = y$ and use it to evaluate $P\left\{\frac{X \leq \frac{1}{2}}{Y = \frac{1}{2}}\right\}$ .	X :	0	1	2	3	4	5	6	7	P(x) :	0	K	2k	2k	3k	k <sup>2</sup>	2k <sup>2</sup>	7k <sup>2</sup> + k	<b>CO242-01.2</b>
X :	0	1	2	3	4	5	6	7												
P(x) :	0	K	2k	2k	3k	k <sup>2</sup>	2k <sup>2</sup>	7k <sup>2</sup> + k												
<b>PART-C</b>																				
Q.4	Out of 800 families with 4 children each, how many families would be expected to have (i) 2 boys and 2 girls (ii) at least one boy (iii) no girls (iv) at most 2 girls. Assume equal probabilities for boys and girls OR Find mean and variance of Binomial distribution.	<b>1*6</b>	CO242-01.2																	

**Marks and Gap Analysis of Mid-Term I**

### Marks and Gap Analysis of Mid-Term 1

Sr. No	RTU Roll Number	Name of the Student	M-1 Marks (70)	Remark ( Remedial Class need or not – Y/N )
1	22ETCCE001	ANKIT KUMAR	49	N
2	22ETCCE002	ARMAAN CHAUHAN	42	Y
3	22ETCCE003	AYUSH SINGH JHALA	45	Y
4	22ETCCE004	PARIDHI NINAMA	59	N
5	22ETCCE005	PRAVEEN DANGI	45	Y
6	22ETCCE006	ROSHNI TABIYAR	61	N

\*(Y, if obtained marks are  $\leq 45$ )

**Signature of Faculty:**

**Signature of HOD**

### Remedial Action Taken to Remove the Gaps (After Mid- Term I)

S.no.	University Roll no.	Name of Student	Topics to be discussed in Remedial Class	Schedule Date of Remedial Class	Outcome Achieved
1.	22ETCCE002	ARMAAN CHAUHAN	Basics of Probability	After I MT to II MT	Y
2.	22ETCCE003	AYUSH SINGH JHALA			
3.	22ETCCE005	PRAVEEN DANGI			

**Signature of Faculty:**

**Signature of HOD**

**Civil Engineering**  
**Advance Engineering Mathematics - II**  
**Mid Term II**

**Max Marks: 70**

**Time:2 Hrs**

**Note:**

- 1) The paper is divided into 2 parts: Part-A and, Part-B
- 2) Part-A contains 10 questions all compulsory and carries 2 mark each.
- 3) Part-B contains 5 questions. Each question is having two options choose one and carries 10 marks each.

**PART – A**

A.	Write the standard form of Normal distribution.	CO3
B.	Write the mean and variance of binomial distribution	CO3
C.	Ten coins are tossed together. Find the probability of getting at least seven heads.	CO3
D.	Define Uniform distribution or rectangular distribution	CO3
E.	Write the Spearman's rank correlation formula.	CO4
F.	Write the statement of principle of least squares	CO4
G.	Explain the positive and negative correlation	CO4
H.	Write the regression coefficients	CO4
I.	Define the test of significance for difference of two means of two large samples.	CO5
J.	Explain the level of significance	CO5

**Part- B (50 Marks)**

1 A	Find the mean and variance of the poisson distribution	CO3
OR		
1(B)	In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the parameters (mean and variance) of the distribution.	CO3

2(A)	Suppose that a manufactured product has two defects per unit of product inspected. Using Poission distribution, calculate the probabilities of finding a product without any defect, 3 defects, and 4 defects.	CO3
OR		
2(B)	The income of a group of 10,000 persons was found to be normally distributed with mean Rs 1750 p.m. and S.D. of rs 50. Show that of this group 95% had income exceeding rs 1668 and only 5% had income exceeding Rs 1832. What was the lowest among the richest	CO3

3(A)	Calculate the karlpearson coefficient of correlation between x and y. From the following data:	CO4
X :	17    18    19    19    20    20    21    21    22    23	
Y :	12    16    14    11    15    19    22    16    15    20	
OR		
3.(B)	Calculate rank correlation coefficient for the following data	CO4
X :	81    78    73    73    69    68    62    58	
Y :	10    12    18    18    18    22    20    24	

4 A	3(A) Fit a parabola of second degree to the following data						CO4
	X	0	1	2	3	4	
	Y	1	1.8	1.3	2.5	6.3	

OR

4(B)	Find line of regression y on x of the following data, and also find the value of y at x = 6.2									CO4	
	X:	1	2	3	4	5	6	7	8		9
	Y:	9	8	10	12	11	13	14	16	15	

5(A)	A sample of heights of 6400 Indians has a mean of 67.85 inches and a SD of 2.56 inches, while sample of heights of 1600 Austrian has a mean of 68.55 inches and a SD of 2.52 inches. Do the data indicate that Austrians are on the average taller than Indians?	CO5
------	--	-----

OR

5(B)	The SD of 64 students of a class in a test is 6.0. A new teacher then took over the class. After one year the same test gave the SD for the class as 5.0. Is there significant reduction in variability made by new teacher? Assume the marks in two tests have correlation = 0.6	CO5
------	---	-----

## Marks and Gap Analysis of Mid-Term II

### Marks and Gap Analysis of Mid-Term 2

Sr. No	RTU Roll Number	Name of the Student	M-1 Marks (70)	Remark ( Remedial Class need or not – Y/N )
1	22ETCCE001	ANKIT KUMAR	52	N
2	22ETCCE002	ARMAAN CHAUHAN	43	Y
3	22ETCCE003	AYUSH SINGH JHALA	43	Y
4	22ETCCE004	PARIDHI NINAMA	64	N
5	22ETCCE005	PRAVEEN DANGI	40	Y
6	22ETCCE006	ROSHNI TABIYAR	61	N

\*(Y, if obtained marks are  $\leq 45$ )

Signature of Faculty:

Signature of HOD

### Remedial Action Taken to Remove the Gaps (After Mid- Term II)

S.no.	University Roll no.	Name of Student	Topics to be discussed in Remedial Class	Schedule Date of Remedial Class	Outcome Achieved
1.	22ETCCE002	ARMAAN CHAUHAN	Correlation, Regression coeff.	After II MT till Exam	Y
2.	22ETCCE003	AYUSH SINGH JHALA			
3.	22ETCCE005	PRAVEEN DANGI			

Signature of Faculty:

Signature of HOD

### Class test (Remedial session)

#### Question Paper

TECHNO INDIA NJR INSTITUTE OF TECHNICAL STUDIES, UDAIPUR

II Internal Examination 2022-23

B. Tech II Year, IV Semester

Sub: Advanced Engineering Mathematics-II (Code: 4CE2-01)

Time: 1.30 Hr

(SET-1)

Max Marks: 20

Q. No.	Question (Attempts all)	Marks	CO																						
<b>PART-A</b>																									
Q.1	Obtain the rank correlation coefficient to the following data : <table border="1" style="margin-left: 20px;"> <tr> <td>X</td> <td>68</td> <td>64</td> <td>75</td> <td>50</td> <td>64</td> <td>80</td> <td>75</td> <td>40</td> <td>55</td> <td>64</td> </tr> <tr> <td>y</td> <td>62</td> <td>68</td> <td>68</td> <td>45</td> <td>81</td> <td>60</td> <td>68</td> <td>48</td> <td>50</td> <td>70</td> </tr> </table>	X	68	64	75	50	64	80	75	40	55	64	y	62	68	68	45	81	60	68	48	50	70	<b>2*3</b>	CO241.4
X	68	64	75	50	64	80	75	40	55	64															
y	62	68	68	45	81	60	68	48	50	70															
Q.2	A car hire has two cars which it hires out day by day, The number of demands for a car on each day is distributed as Poisson variant with mean 1.5 . Calculate the proportion of days on which (i) neither car is used (II) Some demand is refused	CO241.3																							
<b>PART-B</b>																									
Q.3	The distribution of weekly wages for 500 workers in a factory is approximately normal with mean and standard deviation of Rs. 75 and Rs. 15. Find the number of workers who receive weekly wages (i) more than Rs.90 (ii) less than Rs.45. [Given P (0<z<1) = 0..3413, P (0<z<2) = 0.4772, P (0<z<3) =0.4987]	<b>2*3</b>	CO241.3																						
Q.4	Show that $\theta$ , the acute angle between the two lines of regression is given by $\tan \theta = \left( \frac{1-r^2}{r} \right) \left( \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \right)$ . Interprets the case when r = 0 , ± 1		CO241.4																						
<b>PART-C</b>																									

Q.5	(a) Calculates the coefficient of correlation and obtain the line of regression for the following data.									8	CO241.4
	x	1	2	3	4	5	6	7	8		
	y	9	8	10	12	11	13	14	16		15
Obtain also an estimate for y which should correspond on an average to $x = 6.2$											
(b) A Coin is tossed 900 times and head appeared 490 times. Would you conclude that the coin is biased one?											

**Model Question Paper with Key Solution**  
**GEETANJALI INSTITUTE OF TECHNICAL STUDIES, UDAIPUR**  
**RTU Model Paper**  
**B. Tech. II Year, Semester IV**  
**Sub: Advance Engineering Mathematics-II (Code: 4CE2-01)**

**Time: 2.00Hr**

**Max Marks: 80**

Q. No.	Question	Paper Marks	CO
<b>PART-A (Compulsory)</b>			
1	Define joint and marginal distribution.	<b>5*2</b>	CO <sub>242.1</sub>
2	Write Karl Pearson $\beta$ and $\gamma$ coefficients.		CO <sub>243.2</sub>
3	Write the standard form of Normal distribution.		CO <sub>241.3</sub>
4	Write the statement of principle of least squares		CO <sub>241.4</sub>
5	Define the test of significance for difference of two means of two large samples.		CO <sub>241.5</sub>
<b>PART-B (Attempt only 4 out of 6)</b>			
1(a)	From a lot of 25 items , containing 5 defective , a sample of 4 items was drawn at random (i) without replacement (ii) with replacement. Find the expected value of the number of defective items in drawn sample	<b>4*4</b>	CO <sub>241.1</sub>
(b)	State and prove the Baye's Theorem.		



1(a)	<p>a random variable x has the following probability distribution</p> <table border="1" data-bbox="95 324 1141 448"> <tr> <td>X:</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>P(x):</td> <td>0</td> <td>K</td> <td>2k</td> <td>2k</td> <td>3k</td> <td><math>k^2</math></td> <td><math>2k^2</math></td> <td><math>7k^2 + k</math></td> </tr> </table>	X:	0	1	2	3	4	5	6	7	P(x):	0	K	2k	2k	3k	$k^2$	$2k^2$	$7k^2 + k$	2*	CO <sub>231.1</sub>															
X:	0	1	2	3	4	5	6	7																												
P(x):	0	K	2k	2k	3k	$k^2$	$2k^2$	$7k^2 + k$																												
	<p>(iv) Find k  (v) Determine distribution function of x .  (vi) Find <math>P(\frac{1.5 &lt; x &lt; 4.5}{x &gt; 2})</math></p>	7	CO <sub>231.2</sub>																																	
(b)	<p>Calculate the first four moments about mean for the following distribution and also find <math>\beta_1</math> and <math>\beta_2</math></p> <table border="1" data-bbox="95 649 989 772"> <tr> <td>X</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>Y</td> <td>1</td> <td>8</td> <td>28</td> <td>56</td> <td>70</td> <td>56</td> <td>28</td> <td>8</td> <td>1</td> </tr> </table>	X	0	1	2	3	4	5	6	7	8	Y	1	8	28	56	70	56	28	8	1		CO <sub>231.3</sub>													
X	0	1	2	3	4	5	6	7	8																											
Y	1	8	28	56	70	56	28	8	1																											
2(a)	<p>Ten competitors in beauty contest got marks by three judges in the following orders :</p> <table border="1" data-bbox="95 817 1117 1019"> <tr> <td>1<sup>st</sup> judge</td> <td>1</td> <td>6</td> <td>5</td> <td>10</td> <td>3</td> <td>2</td> <td>4</td> <td>9</td> <td>7</td> <td>8</td> </tr> <tr> <td>2<sup>nd</sup> judge</td> <td>6</td> <td>4</td> <td>9</td> <td>8</td> <td>1</td> <td>2</td> <td>3</td> <td>10</td> <td>5</td> <td>7</td> </tr> <tr> <td>3<sup>rd</sup> judge</td> <td>3</td> <td>5</td> <td>8</td> <td>4</td> <td>7</td> <td>10</td> <td>2</td> <td>1</td> <td>6</td> <td>9</td> </tr> </table>	1 <sup>st</sup> judge	1	6	5	10	3	2	4	9	7	8	2 <sup>nd</sup> judge	6	4	9	8	1	2	3	10	5	7	3 <sup>rd</sup> judge	3	5	8	4	7	10	2	1	6	9		CO <sub>231.3</sub>
1 <sup>st</sup> judge	1	6	5	10	3	2	4	9	7	8																										
2 <sup>nd</sup> judge	6	4	9	8	1	2	3	10	5	7																										
3 <sup>rd</sup> judge	3	5	8	4	7	10	2	1	6	9																										
	<p>Use the rank correlation coefficient to discuss which pair of judges have the nearest approach to common tastes in beauty.</p>		CO <sub>231.4</sub>																																	
(b)	<p>Find the constant 'a' so that vector v is a conservative field , where  In a partially destoredlaboratory record of analysis of correlation data , the following results are legible ;  Variance of x = 9 ,regression equation : <math>8x - 10y + 66 = 0</math> , <math>40x - 18y = 214</math> find :</p> <p>(iv) The mean value of x and y  (v) The standard deviation of y and  (vi) Coefficient of correlation between x and y</p>		CO <sub>231.5</sub>																																	
3(a)	<p>obtain the rank correlation for the following data</p> <table border="1" data-bbox="95 1500 1141 1624"> <tr> <td>X</td> <td>68</td> <td>64</td> <td>75</td> <td>50</td> <td>64</td> <td>80</td> <td>75</td> <td>40</td> <td>55</td> <td>64</td> </tr> <tr> <td>Y</td> <td>62</td> <td>58</td> <td>68</td> <td>45</td> <td>81</td> <td>60</td> <td>68</td> <td>48</td> <td>50</td> <td>74</td> </tr> </table>	X	68	64	75	50	64	80	75	40	55	64	Y	62	58	68	45	81	60	68	48	50	74													
X	68	64	75	50	64	80	75	40	55	64																										
Y	62	58	68	45	81	60	68	48	50	74																										
(b)	<p>Two samples give the following results  Sample I: sample size 100, AM 14.72 and SD 3.45  Sample II : sample size 125, Mean 18.65 and SD 4.72  have you reasons to believe that the two AMs are different?</p>																																			



## RESULT ANALYSIS

S.NO.	RTU ROLL NUMBER	NAME OF STUDENT	END TERM MARKS	SESSIONAL MARKS	TOTAL
		MAX MARKS	70	30	100
<b>Set Target Level</b>			<b>60%</b>	<b>70%</b>	
1	22ETCCE001	ANKIT KUMAR		21	
2	22ETCCE002	ARMAAN CHAUHAN		18	
3	22ETCCE003	AYUSH SINGH JHALA		20	
4	22ETCCE004	PARIDHI NINAMA		25	
5	22ETCCE005	PRAVEEN DANGI		19	
6	22ETCCE006	ROSHNI TABIYAR		26	

TOTAL	PASS	FAIL	ABSENT	PASS %
<b>6</b>				

## **Indirect Assessment:**

### **Overall Teacher Self Assessment (at the completion of course) in terms of course objective and outcomes**

#### **Course Objectives:**

To learn the Probability and solve the Discrete and Random variables

To learn the concept and implement of conditional probability mean variance expectation

To learn the concept and implement of all type of distributions using in day to day life problems

To understand the test of significance on large sample data by various ways.

#### **Course Outcomes:**

Students can apply the Probability and solve the Discrete and Random variables

Students can apply the concept and implement of conditional probability mean variance expectation

Students can the concept and implement of all type of distributions using in day to day life problems

Students can apply their knowledge and able to solve by test of significance on large sample data by various ways.

#### **Methodology to identify bright student**

Considered a range of criteria, including academic performance, creativity, critical thinking, problem-solving skills, and enthusiasm for learning. Bright students often excel in multiple areas. Observed how students perform in the classroom. In terms of active participation, engagement in discussions, leadership, and the ability to grasp complex concepts.

#### **Efforts to keep students engaged**

##### 1. Active Learning:

- Incorporate active learning strategies, such as group discussions, problem-solving activities, and hands-on practices. Active participation keeps students engaged and encourages critical problems.

##### 2. Varied Teaching Methods:

- Use a variety of teaching methods, including lectures, group work, multimedia presentations, and interactive activities to cater to different learning preferences.

##### 3. Technology Integration:

- Leverage technology, such as online platforms, educational apps, and interactive software, to make lessons more engaging and interactive.

Some extra learning for bright students like application of many topics and extra questions based on day to day life.

Probability in real life | Probability Examples – YouTube

<https://youtu.be/03xVEjRdi98?si=dwZlhvmURZYAv0Py>

Random Variables and Probability Distribution

Engineering Made Easy · Playlist

<https://youtu.be/82Ad1orN-NA?si=myrPmRDkS1FWheTx>

Test of significance - Large samples

<https://youtu.be/xhIg53kidhg?si=gkM1WQfkvX1WedFb>

## **Methodology to identify weak student**

Considered a range of criteria, including classroom observation, formative assessment, summative assessment, assignment review e.t.c. Weak students are struggling students with sensitivity and a desire to support their learning. Some measures, such as additional tutoring, personalized assignments, or alternative assessment methods, to help students succeed.

## **Targeted inventions for weak student**

### **1. Additional Resources**

Offer supplementary learning materials, such as textbooks, online resources, or multimedia content, to provide alternative explanations and reinforce key concepts.

### **2. Remedial classes**

Establish a tutoring program where students can receive extra help from teachers.

### **3. Flipped classroom**

Students are assigned pre-class learning materials, often in the form of videos, readings, or online modules, to cover the foundational concepts before coming to class.