

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)**

CLASS: BPHARM  
BRANCH: PHARMACY

SEMESTER: VIII  
SESSION: SP2023

SUBJECT: BP801T BIOSTATISTICS AND RESEARCH METHODOLOGY

TIME: 3.00 Hours

FULL MARK: 75

**INSTRUCTIONS:**

1. The missing data, if any, may be assumed suitably.
2. Before attempting the question paper, be sure that you have got the correct question paper.
3. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
4. This question paper consists of (03) three parts. Read the part wise instructions before attempting the questions.

**PART-I**

Objective type questions (Instruction: Answer all questions)

Q1. (10 x 2 = 20 Marks)

A. Find the mode from the following frequency distribution: CO3

Age	7	8	9	10	11	12	13
K. Frequency	3	8	12	15	14	17	9

B. Find the mean for the following data: CO3

Age	10	11	12	13	14
L. Frequency	2	4	6	8	10

C. The weight of 45 people in a society are recorded in kg as follows. Calculate the median weight. CO3

Weight in Kg	46	48	50	52	53	54	55
M. No. of people	7	5	8	12	10	2	1

D. Write down the expression by which regression coefficient ( $R^2$ ) is calculated. CO2

E. Write down the difference between null hypothesis and alternative hypothesis. CO1

F. What are independent and dependent variables in a research design? CO1

G. Define research. CO1

H. In  $2^4$  factorial design, number of independent variables are ..... CO2

I. 'a' represents: CO1

- i. factor 'a' and 'b' at low levels
- ii. factor 'a' and 'b' at high levels
- iii. factor 'a' high level and factor 'b' low levels

J. In simplex lattice design total quantity (in fraction) of factor levels should add to give ..... CO1

**PART-II**

Short Answers

(Instruction: Answer seven out of nine questions)

(7 x 5 = 35 Marks)

Q2. Calculate the mean, median for the following frequency distribution of yield of tablets in tons per batch as follows in the table. CO3

Yield of tablets in tons	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85
Frequency	7	8	12	26	32	42	42	15	17	9

- Q3. Explain what correlation is? The students got the following % of marks in 2 subjects A & B. Calculate the Karl Pearson coefficient of correlation. CO3

Roll No.	1	2	3	4	5	6	7	8	9	10
A	78	36	98	25	75	82	90	62	65	39
B	84	51	91	60	68	62	86	58	53	47

- Q4. Do the regression analysis of the following set of data by considering Absorbance = a\* Concentration + b CO3

Concentration (µg/mL)	Absorbance
10	0.254
20	0.406
30	0.621
40	0.715
50	0.896
60	1.124
80	1.428

- Q5. Describe normal distribution. CO1  
 Q6. Discuss the dynamic structure of research with an hourglass model. CO1  
 Q7. Classify different types of research with examples. CO1  
 Q8. Illustrate the use of different graphs used in a research design. CO2  
 Q9. Design a table for a 2<sup>3</sup> factorial design. CO2  
 Q10. Draw a design space of central composite with two factors and 5-levels. CO3

### PART-III

#### Long Answers

(Instruction: Answer two out of three questions)

(2 x 10 = 20 marks)

- Q11. A. Calculate the exact mode, median from the following distribution: CO3

Particle size	0-11	11-22	22-33	33-44	44-55	55-66	66-77	77-88	88-99
Frequency	9	17	28	26	15	8	7	9	6

- B. Calculate the standard deviation of the following distribution:

Interval	25-30	30-35	35-40	40-45	45-50
Frequency	4	9	12	16	5

- C. Calculate the quartile Q1, Q2 & Q3 for the following data:

Age	10	11	12	13	14	15	16	17
Frequency	5	10	27	18	6	16	38	9

- Q12. Groups of three subjects each were given one of eight food regimens and showed the weight gain (kg) in the following table. These are unpaired data, and this type of study is referred to as a completely randomized experiment. Do One way ANOVA and test for significance at p = 0.01 (the tabulated value at p = 0.01 is 3.71). CO3

A	B	C	D	E	F	G	H
3	4	8	6	10	6	0	4
5	0	6	8	5	4	2	9
9	5	11	1	8	7	8	7

- Q13. Explain simplex-lattice design in optimization process with suitable example. CO2