

# Question Paper

Exam Date & Time: 25-Jul-2024 (10:00 AM - 12:30 PM)

## MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER BSc HEALTH SCIENCES DEGREE EXAMINATION - JULY 2024  
SUBJECT: BHS 1203 - CALCULUS AND STATISTICS  
(NEW SCHEME)

Marks: 60

Duration: 150

Answer all the questions.

1A) Find the local maxima and local minima values, if any, of the function (2)

$$f(x) = 2x^3 - 15x^2 + 36x + 1.$$

1B) If  $\vec{a} = (-2, 1, 2)$ ,  $\vec{b} = (3, 2, -1)$  and  $\vec{c} = (0, 1, 1)$  find  $\vec{a} \cdot (\vec{b} + \vec{c})$  (2)

1C) Differentiate  $x^x$  w.r.t  $x$  (2)

1D) Integrate :  $\int \frac{\sec^2 x}{\csc^2 x} dx$ . (2)

1E) Calculate the geometric mean and the harmonic mean from the following data: (2)

Height	110	115	118	119	120
No. of students	4	11	21	6	2

1F) If  $x$  and  $y$  are connected parametrically by  $x = 4t$  and  $y = \frac{4}{t}$ , find  $\frac{dy}{dx}$ . (2)

2A) Find the angle between the curves  $x^2 = y$  and  $y^2 = x$  at the point (1,1). (3)

2B) Find mean, median and mode for the following data : (3)

Percentage marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No of students	4	9	19	20	18	7	3

2C) Solve :  $\frac{dy}{dx} - y = 0$  (3)

2D) Integrate :  $\int \sin(4x) \sin(3x) dx$  (3)

2E) Calculate Pearson's coefficient of skewness:- (3)

No. of children per couple	0	1	2	3	4	5	6	7
No. of couples	10	15	28	20	10	7	2	2

2F) (3)

A die is thrown. Let D denote the event where the outcome is less than 4, E denote the event where the outcome is an even number greater than 4 and F denote the event where the outcome is a number not less than 3.

a) Find  $D \cap E$ ,  $D - E$ ,  $E \cap F^c$ .

b) Assuming that all outcomes of the die are equally likely, find the probability of all the above events in a].

3A) The following are the runs scored by two batswomen A and B in 10 innings. (5)

A	101	27	0	36	82	45	7	13	65	14
B	97	12	40	96	13	8	85	8	56	15

1. Who is a better run scorer? (Use the arithmetic mean to compare)
2. Who is more consistent in scoring? (Use the coefficient of variation to compare)

3B)

Calculate the correlation coefficient between  $X$  and  $Y$  from the following data.

(5)

X	31	32	33	34	35	36	37	38	39	40
Y	11	12	13	14	15	16	17	18	19	20

Comment about the nature of the correlation between  $X$  and  $Y$ .

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