

Question Paper

Exam Date & Time: 17-Jun-2024 (10:00 AM - 12:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

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

Marks: 60

Duration: 150 mins.

Answer all the questions

2A) Identify the points of local maxima and local minima, if any, of the function (2)

$$f(x) = x^3 - 6x^2 + 9x + 15.$$

2B) 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)

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

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

2E) 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

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

3A) Find the equation of the tangent to the curve $y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at the point (1,3). (3)

3B) 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

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

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

3E) 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

3F) 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. (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].

4A)

The following are the runs scored by two batsmen 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

i) Who is a better run scorer?

ii) Who is more consistent in scoring?

4B)

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.

-----End-----