

B.Sc. (IT) (Sem-2nd)
MATHEMATICS-II
Subject Code: BMAT0-206
Paper ID: [130407]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

- a) An urn contains 10 black and 10 white balls. Find the probability of drawing two balls of the same colour.
- b) A committee is to be formed by choosing two boys and four girls out of group of five boys and six girls. What is the probability that a particular boy named A and particular girl named B are selected in committee?
- c) At what rate of compound interest per annum, a sum of Rs.1200 become Rs.1348.32 in 2 years?
- d) A TV was bought for Rs.21,000. The value of the TV was depreciated by 5% per annum. Find the value of the TV after 3 years..
- e) Show that $f(x) = |x|$ is not derivable at 0.
- f) Find $\frac{dy}{dx}$ of $y = \frac{(x^2+1)}{x^2-3x+2}$.
- g) Find derivative of $\frac{2x^2-1}{x\sqrt{1+x^2}}$.
- h) Integrate $\sin \sin x \cos \cos x (2 \sin \sin x + 3 \cos \cos x)$.
- i) Evaluate $\int \frac{dx}{\cos \cos (x+a) \cos \cos (x+b)}$.
- j) Evaluate $\int_0^{\pi} x \cos x dx$.

Section – B **(5 marks each)**

Q2. A problem of statistics is given to three students A,B and C whose chance of solving it are $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved?

Q3. Compute the standard deviation for the following frequency distribution:

Class Interval	0-4	4-8	8-12	12-16
frequency	4	8	2	1

Q4. Discuss the derivability of the function

$$f(x) = \begin{cases} x, & x < 1 \\ 2 - x, & 1 \leq x \leq 2 \\ -2 + 3x - x^2, & x > 2 \end{cases} \quad \text{at } x = 1, 2.$$

Q5. Discuss derivative of quotient function $y = \frac{u}{v}$ where u, v are derivable functions of x .

Q6. Evaluate $\int_0^{\frac{\pi}{2}} \frac{x}{\sin \sin x + \cos \cos x} dx$.

Section – C **(10 marks each)**

Q7. I) Find the value of median from the following data:

No. of days for which absent (less than)	5	10	15	20	25	30	35	40	45
No. of students	29	224	465	582	634	644	650	653	655

II) If the probability density function of a random variable x is

$$f(x) = \begin{cases} kx^{\alpha-1}(1-x)^{\beta-1}, & \text{for } 0 < x < 1, \alpha > 0, \beta > 0 \\ 0, & \text{otherwise} \end{cases}$$

. Find k and mean of x .

Q8. If $f(x) = \{[1 - 4x^2], 0 \leq x < 1, [x^2 - 2x], 1 \leq x < 2\}$ where $[.]$ denotes greatest integral function. Discuss the differentiability of $f(x)$ in $[0,2]$.

Q9. Evaluate $\int_0^{\infty} \log \log \left(x + \frac{1}{x} \right) \frac{dx}{1+x^2}$.