

(i) Printed Pages: 3 Roll No. ....

(ii) Questions : 7 Sub. Code : 

1	0	4	7	4
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Exam. Code : 

5	0	0	2
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Bachelor of Arts (FYUP) 2<sup>nd</sup> Semester  
(2055)

MATHEMATICS

Basics Mathematics-II

Time Allowed : Three Hours] [Maximum Marks : 68

**Note** :— Attempt **FOUR** questions in all, selecting **ONE** question from each unit. Q. No. 1 is compulsory.

1. (a) Evaluate  $\lim_{x \rightarrow 1} (x^3 - 2x + 1)$ .

(b) Find  $\frac{dy}{dx}$  where  $y = 2x^2 + 3x + 1$ .

(c) Prove that function  $x + 2$  do not have maximum or minimum.

(d) Evaluate  $\int 4x^3 dx$ .

(e) A coin is tossed twice. Describe the sample space.

(f) Find the maximum and minimum value of

$$f(x) = 2x^2; x \in \mathbb{R} \text{ if exist.}$$

(g) Find the interval in which  $f(x) = 6 - 9x - 2x^2$  is increasing.

$$2 \times 7 = 14$$

## UNIT-I

2. (a) Evaluate  $\lim_{x \rightarrow 0} \frac{\sqrt{8+x} - \sqrt{8}}{x}$ .

(b) Examine the continuity of  $f(x) = \begin{cases} x+1 & ; x \leq 2 \\ 2x-1 & ; x > 2 \end{cases}$  at  $x = 2$ . 9+9=18

3. (a) Find  $\frac{dy}{dx}$  where  $y = \sqrt{\frac{(x-1)(x-2)}{(x-3)(x-4)(x-5)}}$ .

(b) If  $y = 3e^{2x} + 2e^{3x}$ , prove that  $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$ . 9+9=18

## UNIT-II

4. (a) Show that function  $f(x) = x^3 - 3x^2 + 4x$ ;  $x \in \mathbb{R}$  is increasing on  $\mathbb{R}$ .

(b) Find the local maximum and local minimum values of function  $f(x) = x^3 - 6x^2 + 9x + 15$ . 9+9=18

5. (a) Verify Rolle's Theorem for  $f(x) = x^2 - 4x + 3$  in  $[1, 3]$ .

(b) Verify Lagrange's mean value theorem for function

$f(x) = x^3 - 2x^2 - x + 3$  on  $[0, 1]$ . 9+9=18

### UNIT-III

6. (a) Evaluate  $\int \frac{x+2}{2x^2+6x+5} dx$ .

(b) Evaluate  $\int \frac{x}{(x+1)(x+2)} dx$ .

$$9+9=18$$

7. (a) In a single throw of two dice, what is the probability of obtaining a total of 9 ?

(b) Four cards are drawn from a well-shuffled deck of 52 cards. What is the probability of obtaining 3 diamonds and 1 spade ?

$$9+9=18$$