# BRAINWARE UNIVERSITY

**Term End Examination 2023-2024**
**Programme – Dip.CSE-2022/Dip.ME-2022/Dip.RA-2022/Dip.EE-2022/Dip.CE-2022/Dip.RA-2023/Dip.CE-2023/Dip.CSE-2023/Dip.EE-2023/Dip.ME-2023**
**Course Name – Mathematics-II**
**Course Code - BS202**
**( Semester II )**

**Full Marks : 60** **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

## Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) The formula $\int a^x dx = \frac{a^x}{\log a} + c$ is invalid for one of the following values of a.

Identify the correct option.

a) 1 b) 2
c) 3 d) None of these

(ii) Identify the value of $\int \frac{e^{2\tan^{-1}x}}{1+x^2} dx =$

a) $e^{2\tan^{-1}x}$ b) $\frac{x}{1+x^2}$
c) $\frac{1}{2}e^{2\tan^{-1}x}$ d) None of these

(iii) Identify the value of $\int_0^{\frac{\pi}{2}} \sin x dx =$

a) 0 b) 1
c) -1 d) none of these

(iv) Identify the order and degree of the differential equation $\left(\frac{dy}{dx}\right)^2 - 2\frac{dy}{dx} = 3x$ .

a) 2,1 b) 2,2
c) 1,1 d) 1,2

(v) Identify that the differential equation whose general equation is y=kx+6 is

a) $y = x\frac{dy}{dx}$ b) $y = \frac{dy}{dx} + 6$

c) $y = x\frac{dy}{dx} + 6$ d) none of these .

(vi) Identify the Median of the frequency distribution

| $x_i$ : | 3 | 2 | 5 | 1 |
|---|---|---|---|---|
| $f_i$ : | 2 | 1 | 1 | 3 |

a) 2 b) 16/7

c) 1/2 d) 7/16

(vii) Examine that one of the roots of $x^3 - 17x + 5 = 0$ lies in between

a) 1 and 2 b) 0 and 1

c) 2 and 3 d) none of these

(viii) Identify the value of $\int \frac{dx}{x \log x} =$

a) logx+c b) log (log x) c

c) 3logx+c d) None of these.

(ix) Choose the correct number of significant figures in 0.03409

a) five b) six

c) seven d) four

(x) Examine the integrating factor of $2xydx + \left(y^2 - x^2\right)dy = 0$ .

a) $\frac{1}{x^2}$ b) $\frac{1}{y^2}$

c) $\frac{1}{x}$ d) $\frac{1}{y}$

(xi) Examine the integrating factor of the equation $\frac{dx}{dy} + \frac{x}{1+y^2} = \frac{e^{-\tan^{-1}y}}{1+y^2}$

a) $\tan^{-1} y$ b) $e^{\tan y}$

c) $e^{\sin^{-1} y}$ d) $e^{\tan^{-1} y}$

(xii) Identify the right condition for independence of two events A and B.

a) $P(A \cap B) = P(A).P(B)$ b) $P(A+B) = P(A).P(B)$

c) $P(A-B) = P(A).P(B)$ d) $P(A \cap B) = P(A).P(B/A)$

(xiii) Identify the probability of obtaining an even number in the throw of a fair die.

a) $\frac{1}{4}$ b) $\frac{2}{5}$

c) 1 d) $\frac{1}{2}$

(xiv) Identify the median of the scores of 9 students 9,8,4,6,7,4,11,13,10 is

a) 9 b) 8

c) 8.5 d) none of these

(xv) Examine the root correct to three decimal places of the equation $x^3 - 3x - 5 = 0$ by using Newton Raphson method?

a) 2.222
c) 2.275

b) 2.279
d) None of these

## Group-B

(Short Answer Type Questions) 3 x 5=15

2. Identify the value of $\int(\frac{1}{x}+x^3+x^6)dx$ (3)

3. Identify the value of $\int 2sinxcosxdx$ (3)

4. One card is drawn from a pack of 52 playing cards. Identify the probability of getting a Diamond. (3)

5. Calculate: $\frac{dy}{dx}=7x$ (3)

6. A class consists of 50 students, out of which 30 are girls. The mean of marks scored by girls in a test is 73 (out of 100), and that of boys is 71. Evaluate the mean score of the whole class. (3)

**OR**

Evaluate the arithmetic mean of the following distribution. (3)

| Marks | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 |
|---|---|---|---|---|---|---|
| No. of students | 5 | 11 | 18 | 22 | 16 | 8 |

## Group-C

(Long Answer Type Questions) 5 x 6=30

7. Tell probability that a leap year, selected at random will contain 53 Sundays. (5)

8. Tell the value of $\int \frac{sinx}{1-cosx}dx$. (5)

9. Identify the solution: $(x+y\cos\frac{y}{x})dx=x\cos\frac{y}{x}dy$ (5)

10. (5)

Write the median for the observations:

| x: | 135-140 | 140-145 | 145-150 | 150-155 | 155-160 | 160-165 | 165-170 | 170-175 |
|---|---|---|---|---|---|---|---|---|
| f: | 4 | 9 | 18 | 28 | 24 | 10 | 5 | 2 |

11. Evaluate $\int_0^1 \frac{1}{1+x^2}\,dx$ by Trapezoidal rule correct upto three decimal places figures. (5)

12. Use Simpson's one-third rule to evaluate $\int_0^6 \frac{dx}{(1+x)^2}$, correct upto three decimal places . (5)

OR

Evaluate the following system by Gauss-Elimination method : (5)

$$2x_1 + 3x_2 + 2x_3 = 2,$$
$$10x_1 + 3x_2 + 4x_3 = 4,$$
$$3x_1 + 6x_2 + x_3 = -6.$$

**********