17602

BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – Dip.CE-2024/Dip.CSE-2024/Dip.EE-2024/Dip.ME-2024/Dip.RA-2024

Course Name – Mathematics-II

Course Code - DBS00004

(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) Identify the value of $\int \frac{\cos 2x dx}{(\sin x+\cos x)^2}$.

a) $\log|\sin x+\cos x|$ b) $\log|\sin x-\cos x|$
c) $-\log|\sin x+\cos x|$ d) None

(ii) Identify the order and degree of the differential equation $x\frac{dy}{dx}+y=0$.

a) 2,1 b) 1,1
c) 1,0 d) none

(iii) Identify that the general solution of the differential equation $\frac{d^2y}{dx^2}+x\frac{dy}{dx}=0$ has

a) 1 arbitrary constant b) 2 arbitrary constants
c) 3 arbitrary constants d) 4 arbitrary constants

(iv) Identify the general solution of x dy – y dx=0.

a) $y^2+x^2=c^2$ b) $y^2=Ax^2$
c) $y=Ax$ d) $y^2=-x$

(v) Examine the integrating factor of the equation $\frac{dy}{dx}+\frac{1}{x}y=x^2$.

a) x b) e^x
c) log x d) none

(vi) Identify the correct condition for two events A and B being mutually exclusive.

a) $P(A \cap B) = P(A).P(B)$ b) $P(A \cap B) = 1$
c) $P(A \cap B) = 0$ d) none

(vii) Identify the probability of an impossible event.

a) $-\infty$ b) 1
c) 0 d) none

(viii) If an unbiased dice is rolled, then identify the probability that an odd point or a six will appear on the top of the dice.

a) $\frac{1}{2}$ b) $\frac{1}{3}$
c) $\frac{2}{3}$ d) none

(ix) If three coins are tossed at random then identify the probability that there will be at least one head.

a) $\frac{3}{8}$ b) $\frac{7}{8}$
c) $\frac{2}{9}$ d) none

(x) Let A and B be two events corresponding to a random experiment E. If $P(A) = \frac{1}{4}, P(B) = \frac{2}{5}$ and $P(A + B) = \frac{1}{2}$, then identify the value of $P(AB)$.

a) $\frac{1}{5}$ b) $\frac{4}{5}$
c) $\frac{1}{6}$ d) $\frac{3}{20}$

(xi) Identify the median of the scores of 9 students: 9,8,4,6,7,4,11,13,10.

a) 9 b) 8
c) 8.5 d) none

(xii) Choose the correct number of significant figures in 0.03409.

a) five b) six
c) seven d) four

(xiii) Write the correct number of significant digits in the number 3.0056.

a) 3 b) 4
c) 5 d) 2

(xiv) Newton' s backward interpolation formula is used to interpolate which of the following option. Choose the correct answer.

a) near end b) near central position
c) near beginning d) none

(xv) Choose the correct degree of precision of Simpson's one third rule.

a) 1 b) 2
c) 3 d) 5

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Identify the value of $\int(x^3 + x\cos x)dx$. (3)

3. Solve the differential equation: $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 24e^{-2x}$. (3)

4. Identify the value of $\int xe^x dx$. (3)

5. Two fair coins thrown. Identify the probability of getting both tails. (3)

6. 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

OR

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)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Identify the value of $\int \frac{\sin x}{1-\cos x} dx$. (5)

8. Identify the solution: $\frac{dy}{dx} = 4x^3$. (5)

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

10. Write the Mean of the following distribution: (5)

x:	158-161	162-165	166-169	170-173	174-177	178-181
f:	11	23	31	18	12	5

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

12. Evaluate the forward difference table using Newton's forward interpolation formula: (5)

x:	1891	1901	1911	1921	1931
f:	46	66	81	93	101

OR

Evaluate the solution by Gauss-Elimination method: (5)

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

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