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**BRAINWARE UNIVERSITY**

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398, Ramkrishnapur Road, Barasat
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Term End Examination 2025-2026

Programme – Dip.CE-2024/Dip.CSE-2024/Dip.EE-2024/Dip.ME-2024/Dip.RA-2024/Dip.CSE-2025/Dip.EE-2025/Dip.ME-2025

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 $\int \frac{3^x}{3^x+1} dx$.

a) $\log |3^x + 1| + c$

b) $3^x + 1 + c$

c) $\log_3 |3^x + 1| + c$

d) $\log_{10} |3^x + 1| + c$

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

a) $\log |\sec 2x + \tan 2x| + c$

b) $\log |\sec 2x - \tan 2x| + c$

c) $\frac{1}{2} \log |\sec 2x + \tan 2x| + c$

d) $\frac{1}{2} \log |\sec 2x - \tan 2x| + c$

(iii) If $\int \frac{\sin^2 x}{\cos^4 x} dx = A \tan^3 x$ then identify the value of A.

a) 3

b) $\frac{1}{3}$

c) -3

d) 4

(iv) Identify the general solution of $\frac{dy}{dx} = \frac{x^2}{y^2}$.

a) $x^3 + y^3 = c$

b) $x^3 - y^3 = c$

c) $x^2 + y^2 = c$

d) $x^2 - y^2 = c$

(v) Identify the solution of the differential equation $2(y+3) = xy' \frac{dy}{dx}$, with $y=-2$ and $x=1$.

a) $x^2 (y+3)^3 = e^{y+2}$

b) $x^2 (y+3) = 5$

- c) $x^4(y+3)=1$ d) $x^2y=9$
- (vi) Identify the correct condition for two events being exhaustive.
- a) $P(A \cap B)=1$ b) $P(A \cup B)=1$
- c) $P(A \cap B)=0$ d) $P(A \cup B)=0$
- (vii) 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
- (viii) 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) $\frac{3}{20}$
- (ix) Identify the correct standard deviation of 4,8,10,12,16 from the below options.
- a) 1 b) 2
- c) 3 d) 4
- (x) Select the relation among mean, median and mode.
- a) Mode=3 Median-2 Mean b) Mode=3 Median+2 Mean
- c) Mode=2 Median-3 Mean d) Mode=2 Median + 3 Mean
- (xi) Choose the correct number of significant figures in 0.03409.
- a) five b) six
- c) seven d) four
- (xii) Choose the correct degree of precision of Simpson's one third rule.
- a) 1 b) 2
- c) 3 d) 5
- (xiii) After rounding off to three places of decimals the number 57.1092 becomes which of the following option. Choose the correct answer.
- a) 57.109 b) 57.100
- c) 57.110 d) 0.109
- (xiv) Examine the false option from the following (the notations have their usual meanings).
- a) $\Delta = E - 1$ b) $\Delta \cdot \nabla = \Delta - \nabla$
- c) $\frac{\Delta}{\nabla} = \Delta + \nabla$ d) $\nabla = 1 - E^{-1}$
- (xv) Examine that one of the roots of $x^3 + 5x - 3 = 0$ lies in between
- a) 1 and 2 b) 0 and 1
- c) 2 and 3 d) none

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Identify the value of $\int (x + e^x + 5x^3) dx$.

(3)

3. Identify the general solution of $\frac{dy}{dx} = ky$. (3)
4. Identify the value of $\int e^{x^3} x^5 dx$. (3)
5. Solve the differential equation: $\frac{dy}{dx} = e^{4y + \ln x}$. (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

Calculate the mean from the data showing marks of students in a class in a test: 40, 50, 55, 78, 58. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Tell the value of $\int \cos^{-1} x dx$. (5)
8. Identify the value of $\int \frac{dx}{x^2 - 4x - 5}$. (5)
9. Explain a random experiment and sample space with examples. (5)
10. Write the mean for the observations: (5)

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 the roots of the equation $2x^2 - 5x + 3 = 0$ using Newton Raphson method. (5)
12. From the following table, evaluate $f(0.16)$ using Newton's forward interpolation formula: (5)

x:	0.1	0.2	0.3	0.4
y=f(x):	1.005	1.020	1.045	1.081

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OR

Evaluate $\int_0^1 \frac{dx}{1+x}$ by Simpson's one-third rule correct up to three decimal places figures.

(5)

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