



**BRAINWARE UNIVERSITY**

**Term End Examination 2018 - 19**

**Programme –Dip. CSE/Dip. ECE/Dip. EE**

**Course Name -Mathematics II**

**Course Code – DCSE204 /DECE204 /DEE204**

(Semester – 2)

**Time allotted: 3 Hours**

**Full Marks : 70**

[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 Questions)

10 x 1 = 10

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

- (i) The complementary function of  $\frac{d^2y}{dx^2} + 4y = x$  is
- |                                |                                |
|--------------------------------|--------------------------------|
| a. $C_1 \cos 2x + C_2 \sin 2x$ | b. $C_1 \cos x + C_2 \sin x$   |
| c. $C_1 \cos 4x + C_2 \sin 4x$ | d. $C_1 \cos 4x + C_2 \sin 4x$ |
- (ii)  $\int \frac{dx}{x \log x} =$
- |                 |                       |
|-----------------|-----------------------|
| a. $\log x + c$ | b. $\log(\log x) + c$ |
| c. $e^x + c$    | d. none of these      |
- (iii)  $\int_0^{\frac{\pi}{4}} (\sec x + \tan x) \sec x dx =$
- |               |               |
|---------------|---------------|
| a. $\sqrt{3}$ | b. 2          |
| c. 1          | d. $\sqrt{2}$ |
- (iv) The Order and Degree of the differential equation  $6x^2 \left(\frac{dy}{dx}\right)^3 + \left(\frac{d^2y}{dx^2}\right)^2 = x$  are
- |            |            |
|------------|------------|
| a. 2 and 1 | b. 2 and 2 |
| c. 2 and 3 | d. 3 and 2 |

- (v) The median of the scores 9,8,4,6,7,4,11,13,10 of 9 students is  
 a. 9  
 b. 8.5  
 c. 8  
 d. none of these
- (vi) The Arithmetic Mean of  $x-2, 10, x+3, 7$  is 9. Then the value of  $x$  is  
 a. 10  
 b. 11  
 c. 0  
 d. 9
- (vii) The probability of any event  $A$  satisfies  
 a.  $P(A) \geq 1$   
 b.  $P(A) < 0$   
 c.  $0 \leq P(A) \leq 1$   
 d. none of these
- (viii) Two events  $A$  and  $B$  are independent if  
 a.  $P(A \cup B) = 1$   
 b.  $P(A \cap B) = P(A) + P(B)$   
 c.  $P(A \cap B) = P(A)P(B)$   
 d.  $P(A \cap B) = 0$
- (ix) In Trapezoidal rule, if the interval of integration  $[a, b]$  is divided into  $n$  number of subintervals, of length  $h$  then the relation between  $n$  and  $h$  is  
 a.  $b = a + nh$   
 b.  $b = a + (n-1)h$   
 c.  $h = b - a$   
 d. Exists no relation between  $n$  and  $h$
- (x) If  $f(x) = 5$  for all values of  $x$ , then  $\Delta f(x) =$   
 a. 5  
 b. 0  
 c.  $\infty$   
 d. none of these

### Group – B

(Short Answer Type Questions)

3 x 5 = 15

Answer any *three* from the following :

2. Find the value of the integral  $\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx$ . [5]
3. Solve  $\frac{dy}{dx} = \frac{y}{x} + \tan \frac{y}{x}$ . [5]
4. Compute  $f(0.5)$  from the given data using Lagrange's interpolation formula. [5]

x	0	1	2	5
f	2	3	12	147

5. Two buckets contain respectively 2 red ,7 green ,4 black balls and 5 black ,1 red , 9 green balls . One ball is drawn from each box. Find the probability that both the balls are of the same colour. [5]
6. Evaluate  $\int x^2 (\log x)^2 dx$  . [5]

**Group – C**

(Long Answer Type Questions)

3 x 15 = 45

**Answer any three from the following :**

7. (a) Solve the differential equation  $xdx + ydy + (x^2 + y^2)dy = 0$  . [5]
- (b) From the following data [5]

Year (x):	1891	1901	1911	1921	1931
Population (y): ( in thousands )	46	66	81	93	101

- find the population in 1935 using Newton’s Backward interpolation formula. [5]
- (c) Find the value of  $\log_e 2$  from  $\int_0^1 \frac{x^2}{1+x^3} dx$  , using Simpson’s  $\frac{1}{3}$  rule by dividing the interval into four equal parts . [5]
8. (a) Evaluate the integral  $\int \frac{x^2 + x - 1}{x^3 + x^2 - 6x} dx$  . [5]
- (b) The table below gives the weights of 50 school boys in the age group 15-17 years in kilogram. Calculate mean and median. [5]

Wt. in kg. (x):	40-42	43-45	46-48	49-51	52-54	55-57	58-60
No. of boys (f) :	3	6	9	13	8	7	4

- (c) An urn contains 7 red balls and 6 white balls. Two successive draws of 4 balls are made without replacement. What is the probability that first drawing will give 4 white balls and the second drawing will give 4 red balls? [5]
9. (a) Use Newton- Raphson method to find a real root of the equation  $3x^3 + 5x - 40 = 0$  . [5]
- (b) If  $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}, P(A \cap B) = \frac{1}{4}$  find [5]
- (i)  $P(A^c)$  (ii)  $P(A \cup B)$  (iii)  $P(A/B)$  (iv)  $P(A^c \cap B^c)$  (v)  $P(A^c \cup B)$
- (c) Determine the integral  $\int e^{x^3} x^5 dx$  . [5]

10. (a) Solve :  $(D^2 + 4)y = \sin x$ . [5]

(b) Compute  $f(0.3)$  for the data [5]

$x$	0	1	3	4	7
$f$	1	3	49	129	813

using Lagrange's interpolation formula .

(c) Six men in a company of twenty two are graduates. If four men are selected out of 22 at random , what is the probability that (i) they are all graduate? [5]

(ii) at least one is graduate?

11. (a) Evaluate  $\int \frac{10^x (\log_e^{10}) + 10x^9}{10^x + x^{10}} dx$  [4]

(b) Find the differential equation of the given curve  $y = Ae^x + Be^{-x}$  . [3]

(c) What is the probability that a leap year, selected at random, will contain 53 Mondays . [3]

(d) Solve the following system by Gauss-Elimination method : [5]

$$x_1 + 2x_2 - x_3 = -3$$

$$3x_1 + x_2 + x_3 = 4$$

$$x_1 - x_2 + 2x_3 = 6$$