18124

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – B.Tech.(ME)-2024/B.Tech.(EE)-2024
Course Name – Advanced Engineering Mathematics
Course Code - BBS00001
(Semester III)

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) Select the correct option. The following digit which is not significant of the number 0.025.

a) 0
b) 2
c) 5
d) None of these.

(ii) Select the correct option. If 'a' be the actual value and 'e' be its estimated value, then define formula for relative error.

a) $\frac{a}{e}$
b) $\frac{|a-e|}{e}$
c) $\frac{(a-e)}{e}$
d) $\frac{|a-e|}{a}$

(iii) Select the correct option. If the number 0.005723 is rounded-off up to three significant digits then select the correct answer.

a) 0.005
b) 0.00572
c) 0.006
d) none of these.

(iv) **Identify the percentage error in approximating $\frac{4}{3}$ to 1.3333.**

a) 0.0025%
b) 25%
c) 0.00025%
d) 0.25%

(v) Select the correct option. The result after rounding off to three places of decimals of the number15.23186

a) 15.231
b) 15.232
c) 15.241
d) 15.2

(vi) Select the correct option. The result after rounding off to five decimal places of the number 15.231865 is__

a) 15.23196
b) 15.23187
c) 15.23186
d) None of these

(vii) Select the correct option. Diagonal dominance is must to explain

a) Gauss-Seidel method
b) Gauss Elimination method
c) LU factorization method
d) All of these

(viii) Select the correct option. Interpret the Newton-Raphson iterative formula for finding the square root of a real number R.

a) $x_{i+1} = \frac{x_i}{2}$
b) $x_{i+1} = \frac{3x_i}{2}$

c) $x_{i+1} = \frac{1}{2}\left(x_i + \frac{R}{x_i}\right)$
d) None of these.

(ix) Select the correct option. Write the order of convergence of Newton-Raphson method is

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

(x) **Select the correct option. In Lagrange's polynomial the sum of the coefficients of $y_0, y_1, \ldots, y_n$ i.e., the sum of the Lagrangian coefficient is calculated as**

a) 2
b) 0
c) 1
d) none of these.

(xi) In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. Calculate the probability that it is neither red nor green

a) 1/3
b) 3/4
c) 7/19
d) 8/21

(xii) If P(A) = 0.4, P(B) = 0.7, and P (A or B) = 0.8, calculate P (A and B)

a) 0.3
b) 0.1
c) 0.2
d) 0.5

(xiii) Choose from the following options which is not a measure of central tendency.

a) Mean
b) Median
c) Standard deviation
d) Mode

(xiv) Compute the median of the data 11,12, 14, 17, 20, and 27, from the following options:

a) 30/2
b) 31/2
c) 33/2
d) 35/2

(xv) The value of the correlation coefficient (r) should be labelled as __________. Choose the correct answer.

a) Greater than 1
b) Less than 1
c) 0 to 1
d) -1 to 1

Group-B

(Short Answer Type Questions) 3 x 5=15

2. **Explain that $\Delta = E - 1$.** (3)

3. Illustrate the forward difference table for the following data: (3)

x	0	1	2	3
$f(x)$	1	2	11	34

4. Describe that a real root of the equation $3x - cosx - 1 = 0$ lies between 0 and 1. (3)

5. Examine the subtraction of the approximate numbers 57.4662 from 786.85. (3)

6. Explain population and sample with example. (3)

OR

A random variable X follows binomial distribution with mean 5/3 and $P(X = 2) = P(X = 1)$. Estimate the mode and variance of the distribution. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Identify the relative error and percentage error in approximating $\frac{7}{6}$ to 1.6666. (5)

8. Identify $\Delta^2(2x + 1)$, taking $h = 1$. (5)

9. In a neighborhood, 90% children were falling sick due flu and 10% due to measles and no other disease. The probability of observing rashes for measles is 0.95 and for flu is 0.08. If a child develops rashes, calculate the child's probability of having flu. (5)

10. Identify the root of $tan\, x + x = 0$ lies between 2 and 2.1, correct upto two decimal places by bisection method. (5)

11. The following frequency table is given below: (5)

Class	1-2	2-3	3-4	4-5	5-6	6-7
Frequency	12	12	15	18	7	9

Evaluate the median of the frequency distribution.

12. A random sample of 400 is taken from a large number of coins. The mean weight of the coins in the sample is 28.57 gms and s.d. is 1.25 gms. Estimate the limits which have a 95% chance of including the mean weight of all the coins. (5)

OR

If T_1, T_2 *and* T_3 are three statistics with expectations $E(T_1) = 3\theta_1 + 2\theta_2 + \theta_3$, $E(T_2) = 2\theta_1 + 3\theta_2 + \theta_3$, $E(T_3) = \theta_1 + \theta_2 + \theta_3$. Estimate Unbiased Estimator of $\theta_1, \theta_2, \theta_3$. (5)

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