



KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Agrl. Engg.) 2023 & Previous Admissions
III Semester Final Examination – January 2025

Sacs.2110

Engineering Mathematics III (2+1)

Marks: 50
Time: 2 hours

I Fill in the blanks **(10x1=10)**

1. $x^3 - 2x^2 + x - 1$ in factorial form =.....
2. $L^{-1} \left[\frac{1}{s} \right] = \dots\dots\dots$
3. If A and B are mutually exclusive events, $P(A \cup B) = 0.6, P(B) = 0.4$, then $P(A) = \dots\dots\dots$
4. The minimum value of correlation coefficient is.....?
5. The range of t-distribution is
6. The procedure which enables us to decide whether to accept or reject the hypothesis is called
7. The process of evaluating a definite integral from a set of tabulated values of the integrand $f(x)$ is called

State True or False

8. Skewness indicates peakedness of the frequency distribution.
9. The general solution of a difference equation is that in which the number of arbitrary constants is equal to the order of the difference equation.
10. The moment generating function of the discrete probability distribution of the variate X about the value $x=a$ is defined as the expected value of $e^{t(x-a)}$.

II Write short notes on ANY FIVE of the following **(5x2=10)**

1. Write down Newton's divided difference formula.
2. Solve the difference equation $u_{n+2} - 2u_{n+1} + u_n = 0$.
3. Explain Trapezoidal rule of numerical integration.
4. Define student's t-distribution.
5. A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased at 5% level of significance.
6. What are the conditions for the validity of χ^2 -test?
7. What is probability density function (PDF) ?

III Answer ANY FIVE of the following. **(5x4=20)**

1. Evaluate the integral $\int_1^2 \frac{dx}{x}$ taking 4 subintervals using Simpson's rule and compare it with the exact value.
2. Using Picard's method of successive approximation, obtain a solution up to the fifth approximation of the equation $\frac{dy}{dx} = y + x$, such that $y=1$ when $x=0$.
3. Solve the initial value problem $y'' + y' - 6y = 0, y(0) = 1, y'(0) = 0$, Using Laplace Transform of Derivatives?
4. From the following table, estimate the number of students who obtained marks between 40 and 45 by using Newton's interpolation formula.

Marks	30-40	40-50	50-60	60-70	70-80
No.of students	31	42	51	35	31

5. The time required to assemble a piece of machinery is a random variable having approximately a normal distribution with $\mu = 12.9$ minutes and $\sigma = 2$ minutes. What are the probabilities that the assembly of a machinery of this kind will take?

- (a) Atleast 11.5 minutes
 (b) Anywhere 11.0 to 14.8 minutes.

[$P(Z = -0.7) = 0.2420$, $P(Z = -0.95) = 0.1711$, $P(Z = 0.95) = 0.8289$]

6. Psychological tests of intelligence and of engineering ability were applied to 10 students. The record of ungrouped data showing intelligence ratio (I.R.) and engineering ratio (E.R.) is given below. Calculate the coefficient of correlation.

Student	A	B	C	D	E	F	G	H	I	J
I.R.	105	104	102	101	100	99	98	96	93	92
E.R.	101	103	100	98	95	96	104	92	97	94

7. For a group of 200 candidates, the mean and standard deviation of scores were found to be 40 and 15 respectively. Later on it was discovered that the scores 43 and 35 were misread as 34 and 53 respectively. Find the corrected mean and standard deviation corresponding to the corrected figures.

IV Write an essay on ANY ONE of the following (1x10=10)

1. Solve the Initial value problem $y' = (y - x)^2$, $y(0) = 0$, $h=0.1$ using Euler method computing 10 steps.
2. Eleven school boys were given a test in drawing. They were given a month's further tuition and a second test of equal difficulty was held at the end of it. Do the marks give evidence that the students have benefitted by extra coaching? [$t_{(0.05,10)} = 2.228$]

Boys	1	2	3	4	5	6	7	8	9	10	11
Marks I test	23	20	19	21	18	20	18	17	23	16	19
Marks II test	24	19	22	18	20	22	20	20	23	20	17
