



**KERALA AGRICULTURAL UNIVERSITY**  
**B.Tech.(Ag. Engg.) 2017 Admission**  
**III Semester Final Examination-January-2019**

Sacs.2110

**Engineering Mathematics-III (2+1)**

**Marks: 50**  
**Time: 2 hours**

**I Fill in the Blanks**

**(10x1=10)**

- 1 The probability density function of normal distribution is \_\_\_\_\_
- 2 Two regression line intersect each other at the point of \_\_\_\_\_
- 3 The concept of regression was given by \_\_\_\_\_.
- 4 Nonsense correlation is \_\_\_\_\_
- 5 Number of roots of  $\frac{x}{2} = \cos(x)$  are \_\_\_\_\_.

**State True or False**

- 6 Range is a measure of dispersion. (True/ False)

**Choose the correct answer.**

- 7 If a polynomial of degree  $n$  has  $n + 1$  roots. Then the polynomial is  
 a. Identically zero    b. Partially zero    c. Both (a) & (b)    d. None of the above.
- 8 The averaging operator  $\mu =$   
 a.  $\frac{1}{2}(E^{\frac{1}{2}} + E^{-\frac{1}{2}})$     b.  $\frac{1}{2}(E^{\frac{1}{2}} - E^{-\frac{1}{2}})$     c.  $(E^{\frac{1}{2}} + E^{-\frac{1}{2}})$     d.  $(E^{\frac{1}{2}} - E^{-\frac{1}{2}})$
- 9 Stirling's interpolation formula is applied for  
 a.  $|p| < 0.5$     b.  $|p| \leq 0.5$     c.  $|p| > 0.5$     d.  $|p| \geq 0.5$
- 10 If Laplace transform of the function  $f(t)$ ,  $L[f(t)] = F(s)$ , then  $L[e^{at}f(t)] =$   
 a.  $F(s/a)$     b.  $F(s+a)$     c.  $F(s-a)$     d.  $F(sa)$

**II Write Short notes on any FIVE of the following**

**(5x2=10)**

- 1 An experiment was conducted under uniform conditions i.e. in lab to compare 3 varieties A, B and C and following observations are recorded related to yield

Varieties	(Yield in Kg)				
A	25	30	40	35	
B	10	8	19		
C	6	4	7	3	10

Test the hypothesis that there is no significant difference between the average yields of these varieties at 5% level of significance.

- 2 A random sample of 40 students is selected from a class and it was found that 8 are from Delhi, 12 from Hyderabad, 5 from Nainital and 15 from Bijapur. Test the hypothesis that students in these groups are in the ratio 1:1:1:1 i.e. 25% in each group. (Given  $\alpha = 0.05$ )

**P.T.O**

- 3 Write four properties of Regression coefficient.
- 4 Find Laplace transform of  $\cosh(at)$ .
- 5 Show that  $\mu^2 = 1 + \frac{1}{4}\delta^2$ , where  $\mu$  and  $\delta$  are the average and central difference operator.
- 6 Evaluate  $\int_1^2 \log(x) dx$  by trapezoidal rule with step length 0.2.
- 7 Solve the following differential equation using Picard's method,  
 $\frac{dy}{dx} = y + x$  and  $y = 1$  when  $x = 0$  Approximate  $y$  when  $x = 0.1$  and  $x = 0.2$  from first approximation up to three decimal places.

III Answer any FIVE of the following.

- 1 Calculate correlation coefficient for regression lines

(5x4=20)

$$4y - 9x - 15 = 0$$

$$x - 4y + 23 = 0 \quad \text{Also, Calculate } V(y) \text{ if } V(x) = 9.$$

- 2 Write short note on Two-sample Z-test. Also test whether the following random sample have come from two independent normal populations having equal means. ( $\sigma_x = 4, \sigma_y = 5$ ), consider level of significance at 5%.

Sample (X)	15	20	15	17	25	20	18	22
Sample (Y)	10	12	9	13	15	16	11	14

- 3 If 100 flips of a coin result in 30 heads and 70 tails, can we assert on the 5% level that the coin is fair?
- 4 Solve the following Ordinary differential equation with help of Laplace transform  
 $y'' - y' = t, y(0) = 1$  and  $y'(0) = 1$
- 5 Given  $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$ . Find  $y(0.2)$  using Runge-Kutta method of fourth order with step length 0.2.

- 6 Apply Newton's divided difference formula to find value of  $y(8)$  and  $y(15)$  from following table:

x	4	5	7	10	11	13
y	48	100	294	900	1210	2028

Find the missing term in the following table

x	10	15	20	25	30	35	40
y	270	---	222	200	---	164	148

IV Answer any ONE of the following

(1x10=10)

- 1 i. Test whether the attributes A and B are associated, given the following contingency table.

	<b>B1</b>	<b>B2</b>	<b>B3</b>	<b>B4</b>	<b>B5</b>
<b>A1</b>	12	37	16	26	22
<b>A2</b>	21	25	13	17	31
<b>A3</b>	31	19	20	15	15
<b>A4</b>	26	31	33	10	20

- 2 a). Estimate y at  $x = 12.2$  with the help of Stirling formula for the data given

x	10	11	12	13	14
y	0.23967	0.28060	0.31788	0.35209	0.38368

Also find derivative of y at  $x = 12.2$ .

- b). Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  by using i) Simpson's 1/3 rule and ii) Simpson's 3/8 rule.

Compare the error in both the cases with actual value of given definite integral.

Take  $h = 1$ .

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Table Value	$t_{14}$	$F_{(2,9)}$	$x_3^2$	$x_{12}^2$
At 5%	2.145	4.46	7.815	21.026