KERALA AGRICULTURAL UNIVERSITY
B.Tech. (Agrl. Engg.) 2019 Admission

III Semester Final Examination-February 2021

Sacs.2110 **Engineering Mathematics-III (2+1)** **Marks: 50**
Time: 2 hours

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

1. _____ method is also known as semi analytical method.
2. The other name for F-test is _____.
3. The test statistic used for bivariate one- sample test is_____.
4. If level of significance (α) = 0.01, then Z_α = _____.

Define the following

5. What are the assumptions of ANOVA?

Choose the correct answer.

6. $\Delta\nabla$ =
   a) $\Delta+\nabla$ b) $\Delta-\nabla$ c) $\frac{1}{2}(\Delta+\nabla)$ d) $\frac{1}{2}(\Delta-\nabla)$
7. Bessel's interpolation formula is applied for
   a) $0.25 < p < 0.75$ b) $0.25 \le p \le 0.75$ c) $p < 0.25$ d) $p < 0.75$
8. Every equation of odd degree has:
   a) Atleast one real root b) Atmost one real root. c) Exactly One root d) None of the above
9. If Laplace transform of the function $f(t)$ is denoted by $L[f(t)]$, then $L[f'(t)]$= _____, where $f'(t)$ is derivative of $f(t)$.
   a) $sL[f(t)]-f(0)$ b) $sL[f(t)]+f(0)$ c) $L[f(t)]-sf(0)$ d) $L[f(t)]+sf(0)$

State whether True or False

10. Regression coefficients are independent of change of scale.

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

1. Define Type-I and Type-II error in testing a hypothesis.
2. Calculate mean and standard deviation for the given data.

X=x	-2	-1	1	4
P[X=x]	0.2	0.3	0.3	0.2

3. Define point estimate and interval estimate.
4. Find Laplace transform of sinh at.
   Show that $\Delta^3 = E^3 - 3E^2 + 3E - 1$, where Δ & E are the forward difference and shifting operator.
5. Evaluate $\int_0^1 e^{-x^2} dx$ by trapezoidal rule with step length 0.2.
6. Find the solution of $\frac{dy}{dx} = \frac{x^2}{y^2+1}$ by Picard's method with $y(0)=0$. Approximate $y(0.25)$ & $y(0.5)$ up to three decimal places using first approximation.
7. Define point estimate and interval estimate.

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

1. The mean yield of a crop for one acre plot is 662 kg with standard deviation 32 kg. Assuming normal distribution, how many 1 acre plots in a batch of 1000 plot would you expect to have yield (i) below 650 kg (ii) above 700 kg.
2. Define Karl Pearson correlation coefficient and its properties. Also, calculate the correlation coefficient for given data. What conclusion can be drawn from the obtained value of correlation coefficient?

Sample(x)	-4	-3	-2	-1	0	1	2	3	4
Sample (y)	4	3	2	1	0	1	2	3	4

3. Using sample of sizes 10 and 16 with variances $s_x^2 = 50$ and $s_y^2 = 30$ and assuming normality of the corresponding populations, test the hypothesis $H_0 : \sigma_x^2 = \sigma_y^2$ against the alternative $\sigma_x^2 > \sigma_y^2$. (Given $\alpha = 5\%$).
4. Find the Inverse Laplace transform of $\frac{e^{-s}}{s^2+\pi^2} + \frac{e^{-2s}}{s^2+\pi^2} + \frac{e^{-3s}}{(s+2)^2}$
5. Given $\frac{dy}{dx} = xy^{\frac{1}{3}}, y(1) = 1.$ Find $y(1.1)$ using Runge-Kutta method of fourth order with step length 0.1.
6. Find $\frac{dy}{dx}$ at $x = 4$ of function tabulated below using Lagrange's formula

x	0	2	5	1
y	0	8	125	1

7. Obtain the missing term in the following table

x	2.0	2.1	2.2	2.3	2.4	2.5	2.6
y	0.135	---	0.111	0.100	---	0.080	0.074

IV **Answer ANY ONE of the following** **(1x10=10)**

1. Test whether the following random samples have come from normal population having equal means.

Sample 1:	25	32	37	30	29	35	40
Sample 2:	30	45	47	39	43	49	
Sample 3:	45	52	48	56	50	55	
Sample 4:	27	20	24	30	35	40	43

2. a). Apply Bessel's formula to find the value of y at $x = 3.75$, given,

x	2.5	3.0	3.5	4.0	4.5	5.0
y	24.145	22.043	20.225	18.664	17.262	16.047

Also find derivative of y at $x = 3.75$.

b). Evaluate $\int_4^{5.2} (\log_e x)\,dx$ 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 $h = 0.2$

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