Printed Pages:02 **Subject Code: RAS304**

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B TECH
(SEM III) THEORY EXAMINATION 2018-19
ENGINEERING MATHEMATICS-III

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a. Write sufficient condition for any function to be analytic.
b. Show that the geometric mean of the coefficients of regression is the coefficient of correlation.
c. Ten percent of screws produced in a certain factory turn out to be defective. Find the probability that in a sample of 10 screws chosen at random, exactly two will be defective.
d. Prove that rate of convergence of Bisection method is 1.
e. Write Newton-Cotes quadrature formula.
f. Find the third divided difference with argument 2,4,9,10 of the function $f(x)=x^3-2x$.
g. Find Z-transformation of $f(k)=\begin{cases}1, & k=0\\ 0, & k\neq 0\end{cases}$

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a. Using the Z-transform solve the following difference equations:
$y_{k+2}+4y_{k+1}+3y_k=3^k$ *given* $y_{(0)}=0,\ y_{(1)}=1$.

b. Find the real root of the equation $x^4-x-9=0$ by Newton-Raphson Method, correct to three places of decimal.

c. Obtain the ranks correlation coefficient for the following data:

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

d. Show that the function defined by
$f(z)=\sqrt{|xy|}$
satisfies Cauchy-Riemann equation at the origin but is not analytic at that point.

e. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using (i) Trapezoidal rule, (ii) Simpson's 1/3 rule and (iii) Simpson's 3/8 rule

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) The two regression equations of the variables x and y are

x = 19.13 – 0.87 y and y = 11.64 – 0.50 x

Find (i) Mean of x's: (ii) Mean of y's: (iii) The correlation coefficient between x and y.

(b) If the probability that an individual suffers a bad-reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals

(a) exactly 3 (b) more than 2 individuals (c) None (d) More than one individual will suffer a bad reaction.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) Find the smallest positive root of $x^3 - 5x + 3 = 0$ by using Regula-Falsimethod.

(b) Apply Newton's backward difference formula to the data below, to obtain a polynomial of degree 4 in x.

x	1	2	3	4	5
Y	1	-1	1	-1	1

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) State and prove Cauchy's Integral theorem.

(b) Find Taylor expansion of $f(z) = \frac{2z^3+1}{z^2+z}$ about the point z=1.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Solve $y_{k+2} + 6y_{k+1} + 9\ y_k = 2^k$ with $y_0 = y_1 = 0$ using z-transforms.

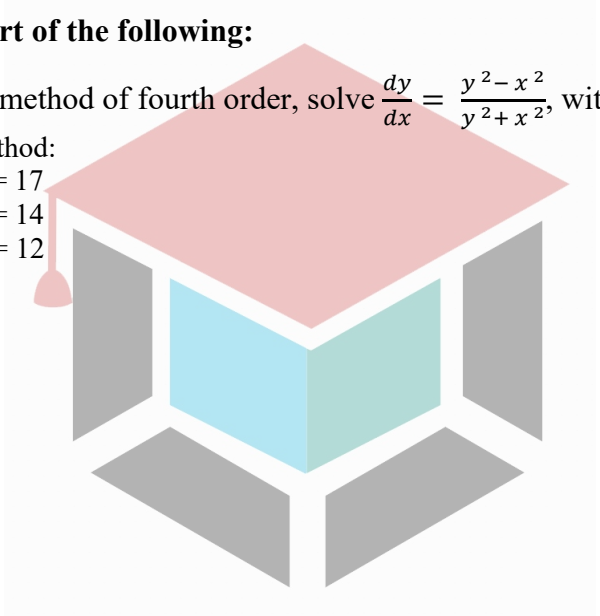
(b) Find Fourier cosine transform of e^{-x^2}.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, with y(0)= 1 at x=0.2 and 0.4

(b) Solve by Jacobi'smethod:

$4x + y + 3z = 17$

$x + 5y + z = 14$

$2x - y + 8z = 12$