Hall Ticket No | | | | | | | | | | Question Paper Code: AHS004

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Supplementary) - May, 2019

Regulation: IARE – R16

COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTIONS

Time: 3 Hours **(ECE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Define the term continuity of a complex variable function f(z). Justify whether every differentiable function is continuous or not. **[7M]**

   (b) Find the real and imaginary parts of an analytic function f(z)=exp(z^2). **[7M]**

2. (a) Difine the term analyticity and differentiability of complex variable function f(z). Prove that an analytic function f(z) with constant real part is always constant. **[7M]**

   (b) Determine the regular function whose imaginary part is e^x sin y. **[7M]**

UNIT – II

3. (a) Define the term power series expansions of complex functions. Write the Cauchy's integral formula and Cauchy's integral formula for multiple connected region. **[7M]**

   (b) Evaluate $\int\limits_0^{1+i} (x^2 + iy)dz$ along the path y = x^2 . **[7M]**

4. (a) Define the term line integral.Evaluate $\int\limits_0^{2+i} z^2dz$ along the real axis to 2 and then vertically to 2+i. **[7M]**

   (b) Using Cauchy's integral formula, evaluate $\int\limits_c \frac{\log z}{(z-1)^3}dz$ where C is a circle |z-1|=1/2.

UNIT – III

5. (a) State Cauchy's residue theorem of an analytic function f(z) with in and on the closed curve, Taylor's theorem and Laurent theorem of complex power series. **[7M]**

   (b) Using Cauchy's residue theorem, evaluate $\int\limits_0^{2\pi} \frac{\cos 2\theta}{5+4\cos\theta}d\theta$. **[7M]**

6. (a) Define

   i. The Isolated singularity of an analytic function f(z).

   ii.Pole of order m of an analytic function f(z).

   iii.Essential and removable singularity of an analytic function f(z). **[7M]**

(b) Obtain the bilinear transformation which maps the points z = -1,0,1 into the points w = 0, i, 3i respectively. Find also the fixed points of the transformation. **[7M]**

UNIT – IV

7. (a) Explain probability distributions for discrete and continuous random variable. **[7M]**

   (b) The first four moments of a distribution about the value 4 of the variable are 1, 4, 10 and 45. Show that mean is 5, variance is 3.

   [7M]

8. (a) Explain mean and variance of discrete and continuous random variables.

   [7M]

   (b) Obtain the MGF of a random variable X having the probability density function

$$f(x) = \begin{cases} x,\ 0 \leq x < 1 \\ 2 - x,\ 1 \leq x < 2 \\ 0,\ elsewhere \end{cases}$$

   [7M]

UNIT – V

9. (a) What is Binomial distribution. Explain in detail about mean and variance of Binomial distribution.

   [7M]

   (b) On an average a certain intersection results in 3 traffic accidents per month. What is the probability that for any given month at this intersection
   i. Less than 3 accidents will occur?
   ii. At least 2 accidents will occur? **[7M]**

10. (a) What is Normal distrubution. Explain the median and variance of a normal distribution.

    (b) An electrical firm manufactures light bulbs that have a life, before burn out, i.e normally distributed with mean of 2040 hours and standard deviation of 60 hours. Find the number of bulbs likely to burn for
    (i) More than 2150 hours
    (ii) Less than 1950 hours and
    (iii) Between 1920 hours and 2160 hours.

    [7M]

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