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

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech IV Semester End Examinations (Supplementary) - July, 2018

Regulation: IARE – R16

COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTION

Time: 3 Hours **(Common to AE | EEE)** **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) Show that an analytic function with constant absolute value is constant. **[7M]**
   (b) Find the derivative of an analytic function whose real part is $e^x \sin y$. **[7M]**
2. (a) Show that $e^{(\overline{z})}$ is everywhere analytic. **[7M]**
   (b) Find the analytic function, whose real part is sin2x/(cosh2y-cos2x). **[7M]**

UNIT – II

3. (a) Evaluate $I = \int_{(z=0)}^{(2+i)} (\bar{z})^2 dz$ along the straight line y=x/2. **[7M]**
   (b) Verify Cauchy's theorem for the integral of f(z)=1/z taken along the triangle formed by the points (1, 2), (3, 2), (1, 4). **[7M]**
4. (a) Expand f(z)=(7z-2)/(z+1)z(z-2) in power series in the region 1<|z+1|<3. **[7M]**
   (b) Evaluate $\int\limits_c e^{2z}/(z+1)^4 dz$, where C is the circle |z-1|=3. **[7M]**

UNIT – III

5. (a) Find the Laurent's series expansion of $f(z) = \frac{1-\cos z}{z^3}$ about $z = 0$ and hence find the type of isolated singularity and also residue at z=0. **[7M]**
   (b) Evaluate $\int_{-\pi}^{\pi} \frac{\cos\theta d\theta}{1+a^2-2a\cos\theta}$ using contour integration. **[7M]**
6. (a) Evaluate $\int\limits_{-\infty}^{\infty} \frac{x^2}{(x^2+1)(x^2+4)} dx$ using contour integration. **[7M]**
   (b) Find the Taylor's expansion of f(z)=(2z^3+1)/(z^2+z) about the point z=i. **[7M]**

UNIT – IV

7. (a) If the distribution of a random variable X is $F(x) = \begin{cases} 1 - e^{-(x-1)}, \text{ if } x \geq 1 \\ 0, \; x < 1 \end{cases}$ then find $f_X(x)$, $P\{2 \leq X \leq 3\}$, $P\{X \leq 2\}$ **[7M]**

   (b) Check whether the function $f(x) = \begin{cases} 0, \; x < 2 \\ \frac{1}{18}(2x+3), \; 2 \leq x \leq 4 \\ 0, \; x > 4 \end{cases}$ is a valid density. If, so find $P\{2 \leq X \leq 3\}$. **[7M]**

8. (a) Determine whether the $G_X(x) = \begin{cases} 1 - e^{-\frac{x}{2}}, x \geq 0 \\ 0, \; x < 0 \end{cases}$ is a valid distribution function. If it is a distribution function then find $P\{-2 < X \leq 3\}$. **[7M]**

   (b) If the probability density function of a random variable X is $f_X(x) = e^{-x}$ then find its mean, variance and $P\{|X| \leq 1\}$. **[7M]**

UNIT – V

9. (a) The mean and varience of a variable X with parameters n and p are 16 and 8. Find P(X≤ 1) and P(X>2). **[7M]**

   (b) The Probability of a man hitting a target is 1/3

   i.If he fires 5 times, What is he probability of his hitting the target twice?

   ii. How many times must he fire so that the probability of his hitting the target least once is more than 90%? **[7M]**

10. (a) Fit a Poisson distribution to the data shown in Table 1 which gives the number of doddens in a sample of clover seeds. **[7M]**

Table 1

No.of doddens:	0	1	2	3	4	5	6	7	8
Observed freq:	56	156	132	92	37	22	4	0	1

   (b) Of a large group of men, 5% are under 60 inches in height and 40% are between 60 and 65 inches. Assuming a normal distribution, find the mean height and standard deviation. **[7M]**

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