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

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IA-R16

COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTION

(Electronics and Communication Engineering)

Time: 3 Hours **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) Examine the nature of the function **[7M]**

$$f\left(z\right)=\left\{\begin{array}{c}\frac{x^2y^5(x+iy)}{x^4+y^{10}}\\ 0,z=0\end{array}\right\},z\neq 0 \text{ in the region including the origin.}$$

(b) Construct an analytic function $f\left(z\right)=u+iv$ given that $u-v=\left(x-y\right)\left(x^2+4xy+y^2\right)$ **[7M]**

2. (a) Prove that $f\left(z\right)=\left|Z\right|^2$ is continuous everywhere but nowhere differentiable except at the origin. **[7M]**

(b) Determine Cauchy-Riemann equations in Polar form. **[7M]**

UNIT – II

3. (a) Evaluate $\int\limits_{1-i}^{2+3i}\left(z^2+z\right)dz$ along the line joining points (1, –1) and (2, 3) . **[7M]**

(b) Let $g(a)=\int\limits_{C}\frac{2z^2-z-2}{z-a}\,dz,,(|a|\neq 3)$ where $C:|z|=3$. Find g(2) using Cauchy's integral formula. What is the value of g(a) if $|a|>3$. **[7M]**

4. (a) Evaluate $\int\limits_{C}\frac{e^{\pi z}.dz}{(2z-i)^3}$ Using Cauchy integral formula, where C is |Z|=1. **[7M]**

(b) Evaluate $\int\limits_{0}^{1+i}\left(x-y+ix^2\right)dz$ along real axis Z=0 to Z=1, and then along the line Parallel to imaginary axis from Z=1 to 1+i . **[7M]**

UNIT – III

5. (a) Determine the Poles and Residues of $\frac{Z}{(Z+1)^2(Z^2+4)}$ **[7M]**

(b) Expand $\frac{Z}{(Z-1)(2-Z)}$ in Laurent Series valid for$|Z-1|<1$. **[7M]**

6. (a) Find the bilinear transformation which maps the points z = 1, i, –1 onto the points w = i, 0, –i . **[7M]**

(b) Evaluate $\int\limits_C \frac{dz}{(z^2+4)^2}$ where $C : |z - i| = 2$,by residue theorem. **[7M]**

UNIT – IV

7. (a) Cumulative distribution function of a discrete random variable 'X' is **[7M]**

X	1	2	3	4	5	6	7
F(x)	0.05	0.15	0.35	0.65	0.85	0.95	k

i. k

ii. probability mass function

iii. P(X $>$ 2)

(b) Let 'X' be a random variable which can take on the values –3, 6, and 9 with probabilities 1/6, 1/2 and 1/3. Calculate third moment about the mean. **[7M]**

8. (a) A perfect coin is tossed twice. Find the Moment generating function of the number of heads. Find Mean and Variance. **[7M]**

(b) Probability density function of a continuous random variable is $f(x) = e^{-x}$, $x > 0$, find the third moment about the mean. **[7M]**

UNIT – V

9. (a) It has been claimed that in 60% of all solar heat installations the utility bill is reduced by at least one-third. Accordingly, what are the probabilities that the utility bill will be reduced by at least one-third in **[7M]**

i. four of five installations

ii. at least four of five installations.

(b) Derive mean of the normal distribution. **[7M]**

10. (a) A communication channel receives independent pulses at the rate of 12 pulse per micro second. The Probability of Transmission error is 0.001 for each micro second use Poisson distribution compute. **[7M]**

i. No error during a micro second

ii. atleast one error per microsecond

iii. atmost two errors.

(b) An air line knows that 5% of the people making reservations on a certain flight will not turn up. Consequently their policy is to sell 52 tickets for a flight that can only hold 50 passengers what is the probability that there will be a seat for every passenger who turns up? **[7M]**