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

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech I/II Semester Supplementary Examinations - July, 2017
Regulation: IA-R16
COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTION
[II Semester - (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) Show that the function $f(z) = \overline{z}$ is continuous at all z but not differentiable anywhere. **[7M]**

   (b) Find all values of k, such that $f(z) = e^x (\cos ky + i \sin ky)$ is analytic. **[7M]**

2. (a) If $v(r, \theta) = r^2 \cos 2\theta - r \cos \theta + 2$ find the analytic function $f(z) = u(r, \theta) + i\, v(r, \theta)$. **[7M]**

   (b) If $(z) = u + iv$ is analytic prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |\text{Re} a l\, f(z)|^2 = 2|f'(z)|^2$. **[7M]**

UNIT – II

3. (a) Evaluate $\int_C \frac{z+2}{z}\, dz$ Where C is **[7M]**

      i. the upper half of the circle $|z| = 2$ in counter clock wise direction
      ii. the lower half of the circle $|z| = 2$ in clock wise direction

   (b) Evaluate $\int_C \frac{e^z}{(z-1)(z-4)}\, dz$, where C:$|z| = 2$. **[7M]**

4. (a) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1)\, dz$ along **[7M]**

      i. $x = t + 1, y = 2t^2 - 1$
      ii. Straight line joining the points 1-i and 2+i

   (b) Verify Cauchy theorem for the function $f(z) = Ze^{-Z}$ over the unit circle with Centre as origin. **[7M]**

UNIT – III

5. (a) Write Laurent's series expansion of $f(z) = \frac{1}{(z^2 - 4z + 3)}$ in powers of for **[7M]**

      i. $|z| < 1$
      ii. $1 < |z| < 3$

   (b) Evaluate $\int_0^{2\pi} \frac{d\theta}{2 - \sin \theta}$ by residue theorem. **[7M]**

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

   (b) Find the poles and residues at each pole of $f(z) = \frac{2z+1}{1-z^4}$. **[7M]**

UNIT – IV

7. (a) The distribution function of a random variable X is given by, $f(x) = 1 - (1 + x)e^{-x}$, x>0 . Find the density function, mean and Variance. **[7M]**

   (b) Find the MGF of a random Variable with $p(x) = pq^{x-1}, x = 1, 2, 3\ldots\ldots$ and hence find mean and Variance. **[7M]**

8. (a) A perfect coin is tossed twice. Find the MGF 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) The number of telephone lines busy at any instant of time is a binomial Variate with Probability 0.1, that the line is busy. If 10 lines are chosen at random, what is the probability that: **[7M]**
        i. No line is busy.
        ii. All lines are busy.
        iii. At least one line is busy.

    (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]**

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