AR13 **Set 02**

Code: 13BS2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular Examinations, January, 2015
COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to CIVIL & MECH.)

Time: 3 hours **Max. Marks: 70**

PART-A

Answer all Questions [10X1=10M]

1. a) Define analytic function
   b) Write C-R equations in polar form
   c) Define singular point
   d) Find the poles of $f(z) = \frac{z^2}{z^2+a^2}$
   e) Define conformal mapping
   f) Define Cross-ratio
   g) If $(A^C) = \frac{3}{8}, P(B^C) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{4}$ them find $P(\frac{B}{A})$
   h) If the probability of a defective bolt is $\frac{1}{8}$, find the mean.
   i) Define type I error
   j) What are the uses of t-test.

Part-B

Answer one question from each unit [5X12=60M]

Unit-I

2. a) Derive the necessary conditions for $f(z)$ to be analytic.
   b) If $f(z)$ is a regular function of z, prove that $(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2})|f(z)|^2 = 4.|f'(z)|^2$

(OR) [6M+6M]

3. a) Find the regular function f(z) whose imaginary part is $Sinhx\ Cosy$
   b) Evaluate $\int_C \frac{\log z}{(z-1)^3} dz$, where $C: |z-1| = \frac{1}{2}$ using Cauchy's integral formula

[6M+6M]

Unit-II

4. a) Using residue theorem, evaluate $\int_C \frac{2z-1}{z(z+3)(z-3)} dz$ where c is the circle $|z| = 2$
   b) Show that $\int_0^{2\pi} \frac{Cos3\theta}{5-4Cos\theta} d\theta = \frac{\pi}{12}$ [6M+6M]

(OR)

5. Evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+a^2)(x^2+b^2)} dx, (a > 0, b > 0)$ [12M]

Unit-III

6. a) Show that under $\omega = \frac{1}{z}$, circle $x^2 + y^2 - 6x = 0$ is transformed in to a straight line in ω- plane.
   b) Discuss the transformation $\omega = e^z$ [6M+6M]

(OR)

7. a) Determine the region D' of the ω- plane into which the triangular region D enclosed by the lines $x = 0, y = 0, \quad x + y = 1$ is transformed under the transformation $\omega = 2z$.
   b) Find the bilinear transformation which maps the points $z = 1, i, -1$ into the point $\omega = 0, 1, \infty$ [6M+6M]

Unit-IV

8. a) A discrete random variable X has the mean 6 and variance 2. If it is assumed that the distribution is binomial find the probability that $5 \leq x \leq 7$
   b) If a random variable has a Poisson distribution such that $P(1) = P(2)$ find i) mean of the distribution ii) P(4) iii) P(1<x<4) [6M+6M]

(OR)

9. In a test on 2000 electric bulbs, it was found that bulbs of a particular make, was normally distributed with an average life of 2040 hours, and SD of 60 hrs. Estimate the number of bulbs likely to burn for i) more than 2150 hrs. ii) more than 1920 hrs. but less than 2100 hrs. [12M]

Unit-V

10. a) The mean life time of a sample of 100 light tubes produced by a company is found to be 1560hrs.With population SD of 90hrs. Test the hypothesis that the mean life time of the tubes produced by the company is 1580hrs.
    b) In a random sample of 400 industrial accidents, it was found that 231 were due at least partially to unsafe working conditions. Construct a 99% confidence interval for the corresponding true proportion. [6M+6M]

(OR)

11. a) The means of two random samples of sizes 9 and 7 are 196.42 and 198.82 respectively. The sum of the squares of deviations from the mean are 26.94 and 18.73 respectively. Can the sample be considered to have been drawn from the same normal population.
    b) A pair of dice are thrown 360 times and the frequency of each sum is indicated below.

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	8	24	35	37	44	65	51	42	56	14	14

Would you say that the dices are fair on the basis of the chi-squares test at 0.05 level of significance? [6M+6M]

AR 13 **Set 01**

CODE : 13EC2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular Examinations, January, 2015
ELECTRONIC DEVICES AND CIRCUITS
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3hours **Max.Marks: 70**

PART - A

Answer all questions [10 X 1 = 10M]

1. a) What is meant by Fermi level in a semiconductor?
   b) What are the majority and minority carriers in a P-type semiconductor?
   c) Define and write the expression for Diffusion capacitance?
   d) Write diode current equation?
   e) What are the applications of Varactor diode?
   ` f) What are the advantages of Bridge rectifier?
   g) Draw the symbols of the P-channel and N-channel JFETs?
   h) What is meant by pinch-off voltage?
   i) What are the drawbacks of fixed bias method?
   j) What type of feedback is employed in emitter follower circuit?

PART – B

Answer one question from each unit [5 X 12 = 60]

UNIT – I

2. a) What is Hall Effect? Derive an expression for Hall coefficient. [8M]
   b) Find the values of d.c. resistance and a.c. resistance of a germanium junction diode at 250C with Io = 25μA and at an applied voltage of o.2V across the diode? [4M]

(OR)

3. a) The voltage across a silicon diode at room temperature (300^{o}K) is 0.7 volts when 2mA current flows through it. If the voltage increases to 0.75V, calculate the diode current (assume V_T = 26mV)? [6M]
   b) Explain about forward bias and reverse bias conditions of P-N junction diode with neat sketch. [6M]

UNIT – II

4. a) How Zener diode acts as voltage regulator? [6M]
   b) Draw the equivalent circuit of a tunnel diode and explain it? [6M]

(OR)

5. a) Draw the circuit diagram of a half wave rectifier and explain its operation with relevant waveforms? [6M]
   b) Derive the expressions for I_{DC}, I_{RMS}, efficiency η and ripple factor γ of a half wave rectifier? [6M]

UNIT –III

6. a) Define the current amplification factors of CB transistor and derive the relationship between them? [6M]
   b) Compare CB, CE and CC transistor configurations [6M]

(OR)

7. a) Explain the construction, characteristics and applications of UJT? [8M]
   b) For a certain UJT relaxation oscillator, the resistance is 10KΩ while the capacitance is 0.1μF. The valley potential is 1.5V when V_{BB} = 20V. Assuming diode cut-in voltage of 0.7V and intrinsic standoff ratio of 0.6. Calculate the frequency of oscillations. [4M]

UNIT –IV

8. a) Discuss about quiescent point, derive the quiescent point in terms of transistor characteristics [8M]
   b) What are the factors that affect the stability of operating point? [4M]

(OR)

9. a) Find the CE h-parameters in terms of the CC h-parameters [6M]
   b) Derive all amplification parameters of transistor [6M]

UNIT –V

10. a) Draw the circuit of Voltage-series feedback amplifier and derive the expressions for input and output resistances [6M]
    b) Explain about different types of amplifiers [6M]

(OR)

11. a) In a Hartley oscillator the value of capacitor is 0.01μF and the value of L_1 and L_2 are 0.04mH and 0.02mH respectively. Find the value of frequency and h_{fe}. [4M]
    b) Explain about hartely oscillator and R-C phase shift oscillator [8M]

AR 13 Set 01

CODE : 13EC2002

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular Examinations, January, 2015
ELECTRONIC CIRCUITS-I
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 hours **Max. Marks: 70**

PART – A

Answer all questions [10X1=10M]

1. a) What is the expression for ripple factor of FWR with L-section filter?
   b) What are the limitations of h-parameters?
   c) What is the need of filters in rectifiers?
   d) What is meant by Biasing?
   e) What is meant by thermal instability in transistors?
   f) What are the advantages of self bias amplifier?
   g) What are the advantages of Small signal model?
   h) What is meant by phase reversal?
   i) What are the dis advantages of fixed bias?
   j) Why gain of a CE amplifier increases at lower frequencies?

PART – B

Answer one question from each unit [5X12=60M]

UNIT – I

2. a) Draw and Explain the operation of FWR with shunt Capacitor filter with Waveforms and Derive the expression for ripple factor?
   b) Compare the performance of L-section and π-section filters? [7M+5M]

(OR)

3. a) Derive an expression of a ripple factor for a FWR with series inductor filter with relevant sketches?
   b) Zener diode can be used as a voltage regulator-justify it? [6M+6M]

UNIT -II

4. a) Explain the method of drawing DC load line for transistor circuit characteristics and obtain the Q- points.
   b) Draw the circuit diagrams of collector to base bias and Self bias and derive the expressions for Stability factor? [6M+6M]

(OR)

5. a) Draw and explain thermistor, sensistor and diode compensation techniques.
   b) Explain how FET act as voltage variable resistor [8M+4M]

UNIT-III

6. a) Why the h-parameters are preferred over other parameters? How can these be determined from the transistor characteristics?
   b) Find CC parameters in terms of the CE parameters. [6M+6M]

(OR)

7. a) Analyse input impedance, current gain, voltage gain, output impedance of a transistor in terms of its h-parameters.
   b) Obtain small signal model of a FET. Compare FET model with the h-parameter model of the BJT. [8M+4M]

UNIT-IV

8. a) State and prove miller's theorem?
   b) With a circuit diagram, explain the operation of a simple common-base amplifier and find its voltage gain expression. [6M+6M]

(OR)

9. a) Explain the effects of coupling and bypass capacitors in amplifier circuit.
   b) Explain the FET amplifier in common source configuration with all mathematical equations? [6M+6M]

UNIT-V

10. Given the following parameters for a given transistor at I_c =10mA, V_{CE} =10V

and the room temperature: h_{fe} =100; h_{ie} =500Ω; $|A_i|$=10 at 10MHz, and Cc=3pF.Find F_T, Ce, $r_{b'e}$ and $r_{bb'}$ [12M]

(OR)

11. a) Explain the common drain FET amplifier at high frequencies .

    b) Explain the concept of gain bandwidth product. [6M+6M]

AR13 **Set 02**

Code: 13BS2006

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular Examinations, January, 2015
PROBABILITY AND STATISTICS
(Common to CSE & IT.)

Time: 3 hours **Max. Marks: 70**

PART-A

Answer all Questions [10X1=10M**]**

1. a) Define Random variable.
   b) Define conditional probability.
   c) What is the probability mass function of a poisson distribution.
   d) Write the formula for mean and variance of the sampling distribution of means using infinite population.
   e) Define Degree of freedom.
   f) Write the formula for 99% confidence limits for the population means.
   g) What is Regression?
   h) Write the formula of correlation coefficient.
   i) What is pure death process?
   j) Write any two characteristics of (M/M/1): (N/FIFO) model.

PART-B

Answer one question from each unit [5X12=60M]

UNIT-I

2. a) Find the probability of getting a sum of 10 if we throw two dice.
   b) The probability density function of a variate 'X' is

X	0	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K	13K

Find P(X<4), P(X≥ 5), $P(3 < X \leq 6)$ [6M+6M]

(OR)

3. A continuous random variable 'X' has the distribution function of

$$F(x) = \begin{cases} 0, if\ x \leq 1 \\ k(x-1)^4, 1 \leq x \leq 3 \\ 1, x > 3 \end{cases}$$

(i) Determine k (*ii*) f (x) (*iii*) Mean. [12M]

UNIT-II

4. a) Define normal distribution and find its mean and variance.
   b) The guaranteed average life of a certain type of electric bulbs is 1500 hrs with a S.D. of 120 hrs. It is decided to sample the output so as to ensure that 95% of bulbs do not fall short of the guaranteed average by more than 2%. What will be the minimum sample size? [6M+6M]

(OR)

5. a) If 'x' is a Poisson Variate such that $3P(x = 4) = \frac{1}{2}P(x = 2) + P(x = 0)$; find (*i*) the mean of 'x' (*ii*) $P(x \leq 2)$.
   b) A normal population has a mean of 0.1 and S.D. of 2.1. Find the probability that mean of a sample size 900 will be negative. [6M+6M]

UNIT-III

6. a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5% level.

   b) The means of two random samples of sizes 9 and 7 are 196.42 and 198.82 respectively. The sum of the squares of the deviations from the mean are 26.94 and 18.73 respectively. Can the sample be considered to have been drawn from the same normal population. [6M+6M]

(OR)

7. Four methods are under development for making discs of a super conducting material. Fifty discs are made by each method and they are checked for super conductivity when cooled with liquid. Apply Chi – Square test and give the conclusion four methods under development for making discs of super conducting matial.

	1st Method	2nd Method	3rd Method	4th Method
Super Conductors	31	42	22	25
Failures	19	8	28	25

[12M]

UNIT-IV

8. Find Karl Pearson's coefficient of correlation for following data:

Wages	100	101	102	102	100	99	97	98	96	95
Cost of living	98	99	99	97	95	92	95	94	90	91

[12M]

(OR)

9. a) Construct a control chart for 'C' that is No. of defectives from the following data pertaining to the number of imperfections in 20pieces of cloth of same length in a certain make of polyster and infer whether the process is in a state of control.3,2,3,1,3,3,2,1,3,1,3,4,2,1,1,1,3,2,2,3

   b) Price indices of cotton and wool are given below for the 12 month of a year. Obtain the equations of lines of regression between the indices.

Price index of cotton(X)	78	77	85	88	87	82	81	77	76	83	97	93
Price index of wool (Y)	84	82	82	85	89	90	88	92	83	89	98	99

[6M+6M]

AR13 **Set 02**

UNIT-V

10. a) A self service canteen employs one cashier at its counter. 8 Customers arrive per every 10 minutes on an average. The cashier can serve on average one per minute. Assuming that the arrivals are poisson and the service time distribution is exponential, determine (i) the average no. of customers in the system
(ii) the average queue length
(iii) the average time a customer spends in the system.

b) Consider a single server queueing system with poisson input and exponential service time. Suppose the mean arrival rate is 3 calling units per hour with the expected service time as 0.25 hrs and the max. permissible no. of calling units in the system is two. Obtain the steady state probability distribution of the number of calling units in the system and then calculate the expected number in the system. [6M+6M]

(OR)

11. A toll gate is operated on a frequency where cars arrive according to a poisson distribution with mean frequency of 1.2 cars per minute. The time of completing payment follows an exponential distribution with mean of 20 seconds. Find i) the idle time of the counter ii) average number of cars in the system iii) average number of cars in the queue iv) average time that a car spends in the system v) average time that a car spends in the queue vi) the probability that a car spends more than 30 seconds in the system. [12M]

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