AR13 **Set 01**

Code: 13BS2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular / Supplementary Examinations, December, 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 "harmonic function"
   b) Define analytic function
   c) State Cauchy's integral formula
   d) Sate Residue theorem
   e) Define bilinear transformation
   f) Find the image of $|Z| = 2$ by the transformation $\omega = z + 3 + 2i$
   g) If a bank received on the average 6 bad cheques per day. Find the probability that it will receive 4 bad cheques on a given day.
   h) State central limit theorem.
   i) Define Type-II error
   j) Define two tailed test.

Part-B

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

UNIT-I

2 a) Prove that the function $f|Z|$ defined by$f|Z| = \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$, $z \neq 0$ and $f(0) = 0$ is continuous and Cauchy-Riemann equations are satisfied at the origin, yet $f^I(0)$ does not exist.

b) Determine the analytic function whose real part is $e^{2x}(x\,Cos2y) - y\,Sin2y$ [6M+6M]

(OR)

3. a) Show that $u = x^2 - y^2$ is harmonic. Find its conjugate harmonic function v and express $u + iv$ as an analytic function of z

b) Sate and prove Cauchy's integral formula. [6M+6M]

UNIT-II

4. Using Cauchy's Residue theorem evaluate $\int_C \frac{Sin\,\pi z^2 + Cos\,\pi z^2}{(z-1)^2(z-2)}\,dz$, where C is the circle $|z| = 3$ [12M]

(OR)

5. a) State and prove residue theorem

b) Find the sum of the residues of $f(z) = \frac{Sinz}{Z\ Cosz}$ as its poles inside the circle $|z| = 2$ [6M+6M]

UNIT-III

6. a) Under the transformation $\omega = \frac{1}{z}$, find the image of $|z - 2i| = 2$

b) Discuss the transformation $\omega = Sinz$ [6M+6M]

(OR)

7. a) What is the region of the ω-plane in which the rectangular region in z-plane bonded by the plane bounded by the lines $x = 0, y = 0,\ x = 1$ and y=2 is mapped under the transformation $\omega = Z + (2 - i)$

b) Find the bilinear transformation which maps the points $z = 1, i, -1$ in to the points $\omega = i, 0, -i$ [6M+6M]

UNIT-IV

8. a) If 10% of the rivets produced by a machine are defective, find the probability that out of the 5 rivets chosen at random

i) none will be defective
ii) one will be defective and
iii) at most two rivets will be defective.

b) A manufacturer of cotter pins knows that 5% of his product is defective. Pins are sold in boxes of 100.He guarantees that not more than 10 pins will be defective. What is the approximate probability? that a box will fail to meet the guarantee quality? [6M+6M]

(OR)

9. a) In a normal distribution 31% of the items are under 42 and 8% are over 64. Find the mean and standard deviation of the distribution.

b) If a 1-gallon can of paint covers on the average 513.3 square feet with a standard deviation of 31.5 square feet. What is the probability that the sample mean area covered by a sample of 40 of these 1-gallon cans will be anywhere from 510.0 to 520.0 square feet. [6M+6M]

UNIT-V

10. a) An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has mean of 11 minutes and the variance of 16 minutes. Test the significance at 0.05 levels.

b) A manufacturer claims that only 4%of his products are defective. A random sample of 500 were taken among which 100 were defective. Test the hypothesis at 0.05 level. [6M+6M]

(OR)

11. a) The manufacturer of a certain make of electric bulbs claims that his bulbs have a mean life of 25 months with a S.D of 5 months. A random sample of 6 such bulbs gave the following values. Life of Months: 24,26,30,20,20,18. Can you regard the procedures, claims to be valid at 1% level of significances?

b) The number of automobile accidents per week in a certain community are as follows: 12,8,20,2,14,10,15,6,9,4.Are these frequencies in a argument with the belief that accident conditions were the same during this10 week period. [6M+6M]

AR13 **Set 01**

Code: 13EC2007

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

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

PART-A

Answer all Questions [10X1=10M]

1. (a) Define drift current.
   (b) What happens to dV/dT when temperature increases?
   (c) Mention any two applications of zener diode.
   (d) Define PIV?
   (e) Find α if β=50?
   (f) What is pinch-off voltage?
   (g) What is meant by Q-point?
   (h) Write the typical h-parameter values of an CC configuration.
   (i) Which type of sampler is used in voltage-shunt feedback amplifier?
   (j) What is Barkhausen criterion?

PART-B

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

UNIT – I

2. a) Draw and explain the energy band diagram for intrinsic semiconductor (6M)
   b) Explain the current components in PN Junction diode. (6M)

(OR)

3. a) Explain the classification of materials based on energy band diagrams (6M)
   b) Explain the effect of temperature on diode characteristics. (6M)

UNIT – II

4. a) Explain the characteristics of tunnel diode with the help of energy band diagram (6M)
   b) Derive the expression for ripple factor in capacitor filter. (6M)

(OR)

5. a) Differentiate between avalanche breakdown and zener breakdown (6M)
   b) Explain the operation of full wave rectifier with waveforms. (6M)

UNIT – III

6. a) Explain how a transistor acts as an amplifier. (6M)
   b) Draw and explain the drain characteristics of n-channel depletion mode MOSFET. (6M)

(OR)

7. a)Explain the construction, working and characteristics of Photo transistor. (6M)
   b) Explain the small signal model of JFET. (6M)

UNIT – IV

8. a) Define three stability factors. Derive the basic expression for stability factor S. (6M)
   b) Explain the set-up for measurement of h-parameters . (6M)

(OR)

9. a) Explain the d.c analysis of collector to base bias. Derive the expression for stability factor S. (6M)
   b) Draw the h-parameter model for CB configuration. Derive the expression for current gain and output impedance of a general transistor amplifier. (6M)

UNIT – V

10. a) Describe with necessary derivations, the effects of negative feedback amplifier. (6M)
    b) Derive the expression for frequency of oscillations in a heartily oscillator. (6M)

(OR)

11. a) Derive the input resistance and output resistance of current shunt feedback amplifier. (6M)
    b) Derive the expression for frequency of oscillations in Colpitts oscillator. (6M)

AR 13 **Set 02**

CODE : 13EC2002

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

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

PART - A

Answer all questions [10 X 1 = 10M]

1. a) High frequency response of an amplifier can be determined from which model?
   b) Define ripple factor of a rectifier?
   c) What is stability factor?
   d) What is thermal runaway in a transistor amplifier circuit?
   e) Why capacitor input filter is preferred to choke input filter?
   f) Why common collector circuit is called an emitter follower?
   g) Given h_{fe}=50 and h_{ie}=0.83KΩ. Find out the input impedance of a transistor in CB configuration?
   h) Define the term transconductance g_m and drain resistance r_d of a FET?
   i) Define the term emitter diffusion capacitance C_{De}?
   j) On what factor the h-parameters of a transistor depend?

PART – B

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

UNIT – I

2. a) Distinguish between Capacitor input and LC filters? [6M]
   b) Determine the ripple factor of a L-type choke input filter comprising a 10H choke and 8μF capacitor used with a full wave rectifier. Compare with a simple 8μF capacitor input at a load current of 50mA. Assume DC voltage of 50V. [6M]

(OR)

3. Explain about working of choke filter and derive expression for Ripple factor. [12M]

UNIT – II

4. a) Determine the quiescent currents and the collector to emitter voltage for a germanium transistor with β=50 in self biasing arrangement. Draw the circuit with a given component value with V_{CC}=20V, R_C = 2KΩ, R_E = 100Ω, R_1 = 100KΩ and R_2 = 5KΩ. Also find out stability factor. [8M]
   b) Explain briefly about Thermal Stability [4M]

(OR)

5. Draw the circuit diagram of Voltage Divider Bias and derive the expressions for stability factors. [12M]

UNIT –III

6. a) Draw the Common Emitter amplifier with an Emitter resistance and derive the expressions for A_V, A_I, and R_i using simplified CE hybrid model? [6M]
   b) For the emitter follower circuit with Rs = 0.5KΩ and R_L = 5KΩ. Calculate A_V, A_I, and R_i . Assume h_{ie} = 1KΩ, h_{fe} = 40 and h_{oe} = 25μA/V. [6M]

(OR)

7. Consider a single state CE amplifier with R_S = 1KΩ, R_1 = 50KΩ, R_2 = 2KΩ, R_C = 1KΩ, R_L = 1.2KΩ, h_{ie} = 1.1KΩ, h_{re} = 2.5 x 10^{-4} , h_{fe} = 50 and h_{oe} = 25μA/V as shown in figure. Find A_i, R_i, A_v, Ai = I_L/I_S, A_{vs} = V_0/V_S and Ro. [12M]

UNIT –IV

8. Draw hybrid model for transistor amplifier and derive the expression for A_i, A_V R_i, R_O, A_{is} and A_{vs} [12M]

(OR)

9. a) Draw the circuit diagram of CS amplifier with fixed bias and draw the small signal low frequency equivalent circuit and compute its voltage gain A_V, input impedance and Output impedance [8M]
   b) In the CS amplifier if drain resistance $\mathbf{R_D = 5K\Omega}$, μ = 50 and $\mathbf{r_d = 35\ K\Omega}$. Evaluate the voltage gain? [4M]

UNIT –V

10. a) Derive the expressions for feedback conductance and base spread resistance of CE amplifier at high frequencies using hybrid-π model [8M]
    b) The CE short circuit current gain of a transistor is 25 at a frequency of 25MHz. If f_β = 200KHz. Calculate (i) f_T, (ii) h_{fe} and (iii) A_I at a frequency of 10MHz. [4M]

(OR)

11. Draw an approximate equivalent hybrid-π circuit for the calculation of short circuit CE current gain and derive the same. Derive the equations f_β and f_T. [12M]

AR13

CODE: 13BS2006 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.TECH I SEM REGULAR/SUPPL. EXAMINATIONS, DECEMBER, 2015

PROBABILITY AND STATISTICS
(COMPUTER SCIENCE AND ENGINEERING & IT)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions **[1 x 10 = 10 M]**

1. a) Define Random variable
   b) Define Probability mass function of a discrete random variable
   c) In a single throw with two dice find the probability of throwing a sum is a perfect square
   d) State Central Limit Theorem
   e) Define Alternative Hypothesis
   f) Find the value of the finite population correction factor for n = 5 and N = 200
   g) What is large sample
   h) Write any two properties of rank correlation coefficient
   i) Define Statistical Quality Control
   j) Define pure birth process

PART – B

Answer one question from each unit **[5x12 = 60M]**

UNIT - I

2 a) Determine (i) P(B/A) (ii) $P(A/ B^C)$ if A and B are events with P(A) = 1/3, P(B) = 1/4 and $P(A \cup B) = 1/2$

b) A player tosses two fair coins. He wins Rs. 100/- if head appears, Rs/- 200 if two heads appear. On the other hand he losses Rs 500/- if no head appears. Determine the expected value of the game and is the game favourable to the player? [6M+6M]

(OR)

3. a) In a certain college, 25% of boys and 10% of girls are studying Mathematics. The girls constitute 60% of the body. (i) What is the probability that Mathematics is being studied? (ii) If a student selected at random and is found to be studying Mathematics, find the probability that the student is a girl? (iii) a boy?

b) In a certain city the daily consumption of electric power (in millions of kilowatts hours) is a random variable having the probability density

$$f(x) = \begin{cases} \frac{1}{9} x e^{-\frac{x}{3}} & \text{for } x > 0 \\ 0 & \text{for } x \leq 0 \end{cases}$$

In the city's power plant has a daily capacity of 12 million kilowatt-hours. What is the probability that this power supply will be inadequate on any given day? [6M+6M]

UNIT - II

4. a) Define Poisson Distribution and find its mean and variance

b) In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63.What are the mean and standard deviation of the distribution? [6M+6M]

(OR)

5.a) The mean and variance of a binomial variable X with parameters n and p are 16 and 8. Find $P(X \geq 1)$ and $P(X>2)$

b) A population consists of five numbers 2, 3, 6, 8 and 11.Consider all possible samples of size 2 that can be drawn without replacement from this population. Find (i) The mean of the population (ii) The standard deviation of the population (iii) The mean of the sampling distribution of means (iv) The standard deviation of the sampling distribution of means [6M+6M]

UNIT – III

6. Samples of two types of electric light bulbs were tested for length of life and following data were obtained

Type I	Type II
Sample numbers $n_1 = 8$	$n_2 = 7$
Sample mean $\bar{x}$ = 1234 hours	Sample mean $\bar{y}$ = 1036 hours
Sample S. D. S_1 = 36 hrs	S_2 = 40 hrs

Is the difference in the means sufficient to warrant that type I is superior to type II regarding length of life [12M]

(OR)

7) An experiment was designed to study the performance of 4 different detergents for cleaning fuel injectors. The following 'cleanness' readings were obtained with specially designed equipment for 12 tanks of gas distributed over 3 different models of engines:

	Engine 1	Engine 2	Engine 3	**Totals**
Detergent A	45	43	51	139
Detergent B	47	46	52	145
Detergent C	48	50	55	153
Detergent D	42	37	49	128
Totals	**182**	**176**	**207**	**565**

Looking on the detergents as treatments and the engines as blocks, obtain the appropriate analysis of variance table and test at the 0.01 level of significance whether there are differences in the detergents or in the engines [12M]

UNIT –IV

8.a) The ranks of 10 students in Mathematics and Statistics are as follows

Statistics	1	2	3	4	5	6	7	8	9	10
Mathematics	2	4	1	5	3	9	7	10	6	8

Calculate the Spearman's rank correlation coefficient for proficiencies of this group in Mathematics and statistics.

b) From the following data calculate (i) correlation coefficient (ii) standard deviation of Y bxy = 0.85Y: bxy = 0.89 X : standard deviation of X is 3 [6M+6M]

(OR)

9. a) From the following data calculate the rank correlation coefficient

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

b) Find the curve of best fit of the type $y = a\, e^{bx}$ to the following data by the method of least Squares [6M+6M]

x	1	5	7	9	12
y	10	15	12	15	21

UNIT –V

10. Arrival rate of telephone calls at a telephone booth are according to Poisson distribution with an average time of 12 minutes between two consecutive call arrivals. The length of telephone calls is assumed to be exponentially distributed with mean 4 minutes
    (i) Find the probability that a caller arriving at the booth will have to wait
    (ii) Find the average queue length that forms from time to time
    (iii) Find the fraction of a day that the phone will be in use.
    (iv) What is the probability that an arrival will have to wait for more than 15 minutes before the phone is free.
    (v) The telephone company will install a second booth [12M]

(OR)

11. a) Explain about queuing theory characteristics
    b) A bank plans to open a single server drive-in banking facility at a certain center. It is estimated that 20 customers will arrive each hour on average. If on average, it requires 2 minutes to process a customer's transactions, determine
    (i) The proportion of time that the system will be idle
    (ii) On the average, how long a customer will have to wait before reaching the server
    (iii) The fraction of customers who will have to wait [6M+6M]

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