Code: 13BS2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2017
COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to CIVIL & MECH)

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

PART-A

Answer all Questions　　　　　　　　　　　　　　　　**[10x1=10M]**

1. a) If $2x - x^2 + ay^2$ is harmonic ,find the value of a .

   b) Evaluate　$\int_C \frac{dz}{z-a}$ where C is the circle $|z - a| = r$.

   c) Give different types of singularities.

   d) Find the residue of f at z = -2 where $f(z) = \frac{z^2}{(z-1)^2(z+2)}$.

   e) Define fixed points or invariant points of a bilinear transformation .

   f) Define Conditional Probability .

   g) Write Mean and Variance of Poisson Distribution

   h) Write the MGF of Normal Distribution.

   i) Write the statement of Baye's theorem.

   j) Define Population.

PART-B

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

UNIT-I

2. a) Find an analytic function $f(z) = u + iv$, if u-v= $e^x(cosy - siny)$.

   b) Evaluate $\int_C \frac{e^{2z}dz}{(z+1)^4}$ around C:$|z - 1|$ =3 by using Cauchy's integral formula [6M+6M]

(OR)

3. a) If $f(z)$ is a regular function, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$.

   b) Prove that the polar form of Cauchy- Riemann equations are
   $$\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \theta} \, , \frac{\partial u}{\partial \theta} = -r\frac{\partial v}{\partial r} .$$
   　　　　　　　　　　　　　　　　　　　　　　　　[6M+ 6M]

UNIT – II

4. a) Using Residue theorem, evaluate $\int_C \dfrac{1}{(z^2+1)(z^2-4)}\,dz$, where C is |z|=1.5.

   b) Using calculus of residues show that $\int_0^{2\pi} \dfrac{d\theta}{2+\cos\theta} = \dfrac{2\pi}{\sqrt{3}}$.   [6M+6M]

(OR)

5. a) Evaluate $\int_{-\infty}^{\infty} \dfrac{x^2}{(x^2+1)(x^2+4)}\,dx$.

   b) Evaluate $\int_C \tan z\,dz$ where C is the circle $|z|= 2$.   [6M+6M]

UNIT –III

6, Discuss the transformation $w=e^z$ and hence find the image of the region bounded by $0 < y < \pi/2$ and $2 < x < 3$ under the above transformation.   [12M]

(OR)

7. a) Show that under the transformation $w = \dfrac{2z+3}{z-4}$ changes the circle $x^2+y^2- 4x=0$ into a straight line 4u+3=0.

   b) Find the bilinear transformation which maps the points $z= \infty, i, 0$ onto the Points w= $0, i, \infty$.   [6M+6M]

UNIT –IV

8. a) In a bolt factory machines A,B,C manufacture 20%,30%and 50% of the total of their output and 6%,3%and 2% are defective. A bolt is drawn at random and found to be defective Find the probability that it is manufactured from machine A.

   b) Average number of accidents on any day on a national highway is1.8Determine the probability that the number of accidents are (i) at least one (ii)at most one. [6M+6M]

(OR)

9. a) Define Binomial distribution of a discrete random variable and find its mean and variance.

   b) If X is Normal variate with mean 30 and S.D 5. Find the probabilities of
   (i) $26 \leq X \leq 40$
   (ii) $X \geq 45$ [6M+6M]

UNIT –V

10. a) Discuss Type-I and Type-II errors in sampling .

    b) A random sample of size 81 was taken whose variance is 20.25 and mean is 32.Construct 98% confidence interval.   [6M+6M]

(OR)

11.a) A random sample of 8 observations the sum of the squares of deviations of the sample values from the sample mean was 84.4 and in the other sample of 10 observations it was 102.6 test whether this difference is significant at 5% level.

   b) Describe the χ^2 - test of goodness of fit.   [6M+6M]

AR13

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2017
ELECTRONIC DEVICES AND CIRCUITS
(Electrical & Electronics Engineering)

Time: 3 Hours   Max Marks: 70

PART-A

ANSWER ALL QUESTIONS   [1 x 10 = 10 M]

1. a) Write the energy-band gap and cut-in voltage values for Si and Ge semiconductors at room temperature.
   b) Differentiate between ideal and practical P-N junction diode.
   c) List out the applications of LEDs.
   d) Write the relation between α, β and γ of a transistor.
   e) Why FETs are called as voltage controlled devices.
   f) Define Early effect of a transistor.
   g) Define the stability factor S.
   h) Write the differences between amplifiers and oscillators.
   i) Differentiate between series and shunt mixing.
   j) Why H-parameters of a transistor are called as hybrid parameters.

PART-B

Answer one question from each unit   [5x12=60M]
UNIT-I

2. (a) What is the necessity of doping? Explain the formation of extrinsic semiconductors and the position of the fermi-energy level in these conductors.   **6M**
   (b) Distinguish between drift current and diffusion current. Derive the expression for conductivity of a semiconductor.   **6M**

(OR)

3. (a) Explain the effect of temperature on reverse saturation current ,breakdown voltage, cut-in voltage and diode's forward voltage drop of a P-N junction diode with neat sketch.   **6M**
   (b) What are the different types of capacitances associated with the P-N junction diode. Derive the expression for diffusion capacitance of a P-N junction diode.   **6M**

UNIT-II

4. (a) What is Tunneling phenomenon? Explain the principle of operation of tunnel diode and draw its V-I characteristics.   **6M**
   (b) Explain the breakdown mechanisms in P-N junction diode. Draw the circuit symbol and its V-I characteristics in forward and reverse bias conditions.   **6M**

(OR)

5. (a) Draw the circuit diagram of full wave rectifier with capacitor filter and explain its operation. Also derive the expression for ripple factor.   **6M**

    (b) Compare Half wave, full wave and bridge rectifiers   **6M**

UNIT-III

6. (a) Draw the circuit diagram for transistor in CE configuration and explain its input and output characteristics.   **6M**

    (b) Briefly describe the following terms: **6M**
         (i) Base-width modulation
         (ii) Punch-through
         (iii) Photo-transistor

(OR)

7. (a) Explain the construction and working of N-channel Depletion type MOSFET and its output characteristics.   **6M**

    (b) Draw the circuit symbol and electrical equivalent circuit of a UJT. Explain the working of UJT with the help of its V-I characteristics.   **6M**

UNIT-IV

8. (a) For the circuit shown in fig.2, determine the coordinates of the operating point. Assume $V_{BE} = 0.7\ V$ and $\beta = 100$.   **6M**

fig.2
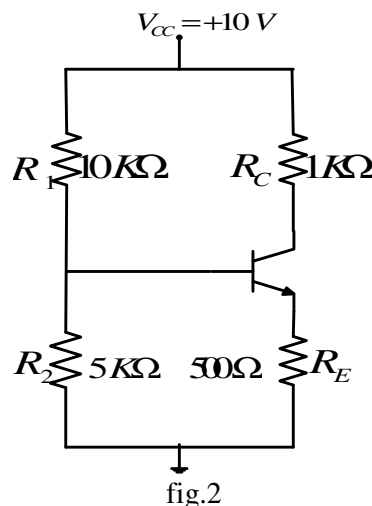
    (b) What is meant by thermal runaway? Derive the condition for transistor to avoid thermal runaway.   **6M**

(OR)

9. (a) Draw the H-parameter model of transistor in CE configuration. Derive the expressions for voltage gain and input impedance.   **6M**

    (b) Compare CB,CE and CC configurations of a transistor with respect to input impedance (Z_i), output impedance (Z_o), current gain $((A_I)$, voltage gain (A_V) phase shift and write one application for each configuration.   **6M**

SET-2

UNIT-V

10. (a)   Classify the amplifiers based on the nature of the input and output signals of   **6M**
           interest. Draw the equivalent circuit diagrams for voltage-shunt and current-series
           amplifiers.
     (b)   Explain the effect of negative feedback on the characteristics of amplifiers.   **6M**
                                         (OR)
11. (a)   Draw the circuit diagram of a RC phase shift oscillator using BJT and derive the   **6M**
           expression for sustained frequency of oscillations.
     (b)   Draw the circuit diagram of a Colpitt's oscillator using BJT and derive the   **6M**
           expression for sustained frequency of oscillations.

AR13

CODE: 13EC2002   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2017

ELECTRONIC CIRCUITS-I
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 hours   Max. Marks: 70

PART – A

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

1. a) List any two applications of zener diode
   b) What is meant by critical inductance?
   c) What is meant by Amplification and in what region of the characteristics the transistor is operated as an amplifier?
   d) What are the different biasing techniques of a transistor
   e) Which is the most commonly used transistor configuration. Why?
   f) What are half power frequencies? Why it is named so?
   g) Define pinch- off- voltage of JFET.
   h) What is the significance of emitter resistance in CE amplifier
   i) Define f_T of a transistor
   j) What is the effect of temperature on h_{fe} of a transistor

PART – B

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

UNIT – I

2. a) Explain the line regulation and load regulation characteristics of zener diode
   b) Derive the ripple factor of FWR with CLC- filter and explain

(OR)

3. a) What is the significance of bleeder resistor in filters
   b) In a full wave rectifier using an LC filter L=10H, C=100µF and RL=500Ω. Calculate Idc, Vdc, ripple factor for an input of Vi=30 sin(100πt)V.

UNIT -II

4. Explain the term thermal run away and derive the conditions to avoid thermal runaway

(OR)

5. a) What is bias compensation, explain bias compensation using thermistors
   b) For a CE amplifier with collector to base bias the Q-point is (6V, 1mA), Vcc=10V, β=100 Vbe=0.7V. Calculate R_B and R_C

UNIT-III

6. a) Explain the determination of h-parameters from transistor characteristics
   b) A transistor used in CB amplifier has the following values of h parameters, hib=28Ω, hfb= -0.98, hrb=5×10⁻⁴, hob= 0.34×10⁻⁶A/V. Determine input impedance, output impedance, current gain and voltage gain of CE transistor if R$_L$=5KΩ, neglect source resistance

SET-2

(OR)

7. Analyze the single stage CE amplifier with emitter resistor using simplified small signal model

UNIT-IV

8. Derive the equations for input impedance, voltage gain and output resistance in the case of common source FET with source resistance using small signal model

(OR)

9. a) State and prove millers theorem?
   b) Give the approximate H-parameter conversion formulae for CB and CC configuration

UNIT-V

10. a) Derive the equation for CE short circuit current gain.
    b) Discuss about various capacitances in a transistor at high frequencies.

(OR)

11. a) Draw an emitter follower at high frequencies. Explain with π-model
    b) What is the effect of temperature on hybrid parameters at high frequencies

***

AR13

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2017
PROBABILITY AND STATISTICS
(Common to CSE and IT)

Time: 3 Hours   Max Marks: 70

PART-A

ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) State the axioms of probability
    b) If p1,p2 are the probabilities of passing the examination respectively, the the probability of only one failing in the examination is
    c) What are the mean and variance of the Binomial and Poisson distribution
    d) What is the value of correction factor if n=5 and N=200
    e) Define Type-I, Type-II errors
    f) What is the statistic to test the difference of means if two samples are drawn from two populations with unknown standard deviations
    g) What is the formula and significance of rank correlation coefficient
    h) Give relationship between covariance in terms of Expectation
    i) If λ=8 and μ =12 per hour, the average time spent by the customer in the system is
    j) In (M/M/1):(∞/FIFO) model what is the average queue length

PART-B

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

UNIT-I

2. a. The probabilities that students A,B,C,D solve a problem are 1/3, 2/5, 1/5 and 1/4 respectively. If all of them try to solve the problem, what is the probability that the problem is solved.   5M

    b. The probability density function of a variate X is as follows: 7M

X	-2	-1	0	1	2	3
P(X)	0.1	k	0.2	2k	0.3	k

    Find i. K, ii.Mean, iii. Variance

(OR)

3. a. Of the three men, the chances that a politician, a business man or an academician will be appointed as a vice-chancellor of a University are 0.5, 0.3, 0.2 respectively. Probability that research is promoted by these persons if they are appointed as VC are 0.3, 0.7 and 0.8 respectively.   6M
    i. Determine the probability that research is promoted
    ii. If research is promoted what is the probability that VC is an academician.

    b. If X is a continuous random variable and k is a constant then prove that Var(X+k)=var(X), ii.Var(kX) = k^2 Var(X)   6M

UNIT-II

4. a If X is a poisson variate such that 3 P(x=4)=1/2P(x=2)+p(x=0), find the i. Mean, ii.P(x=<2)   6M

    b. In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and Standard deviation of the distribution.   6M

(OR)

5. a Find the moment generating function of the exponential distribution $f(x)=(1/c)e^{-(x/c)}$, $0 =< x =< \infty$, $c>0$. Hence find its mean and SD   6M

   b Fit a poisson distribution to the following   6M

x	0	1	2	3	4
f	46	38	22	9	1

UNIT-III

6. a. The means of simple samples of sizes 1000 and 2000 are 67.5 and 68.0 cm respectively. Can the samples be regarded as drawn from the same population of SD 2.5cm.   6M

   b. A set of five similar coins is tossed 320 times and the result is   6M

No. of heads	0	1	2	3	4	5
Frequency	6	27	72	112	71	32

   Test the hypothesis that the data follow a binomial distribution

(OR)

7. a. As a psychologist who works with people who have Down's syndrome, you design a study intended to determine which rewards are most effective for use in training your patients. You select four different, independent, groups of six patients and record the number of days it takes to teach them a particular task, with each group receiving one of four types of rewards: Reward 1, Reward 2, Reward 3, and Reward 4. the number of days are given in the following table.   8M

Reward 1	Reward 2	Reward 3	Reward 4
3	6	9	12
5	7	10	13
6	9	15	15
2	7	12	18
1	11	11	15
2	6	10	13

   b. If the mean breaking strength of copper wire is 575lbs, with a standard deviation of 8.3ls. How large a sample must be used in order that there will be one chance in 100 that the mean breaking strength of the sample is less than 572lbs   4M

UNIT-IV

8. Fit a second degree parabola for the following data   12M

x	1929	1930	1931	1932	1933	1934	1935	1936	1937
y	352	356	357	358	360	361	361	360	359

(OR)

9. a If x is the pull required to lift a load y by means of a pully block, find a linear law of the form y=mx+c connecting x and y, using   6M

x	12	15	21	25
y	50	70	100	120

   Compute y when x=30 units.

   b Draw a rough sketch of x-bar chart for y={352,356,357,358,360,361,360,359}   6M

UNIT-V

10. a   A machine repairing shop gets on average 16 machines per day (eight hours per day) for repair and the arrival pattern is Poisson. At the moment there is no repair man available at the shop. The shop owner has two applicants A and B for the job of repairman. Both A and B claim that the service times are exponentially distributed with mean 20 and 15 min respectively. They demand salaries Rs.500 and Rs.600 per day respectively. The lost time costs Rs.50/ per hour per machine. Assuming that the claims of the applicants are true, which one should be employed.   8M

   b   Explain Pure birth and death process   4M

(OR)

11. a.   Patients arrive at a clinic in a Poisson manner at an average of 6 per hour. The doctor on average can attend to 8 patients per hour.   4M
Assuming that the service time distribution is exponential find i. Average number of patients waiting in the queue, ii.Average time spent by a patient in the clinic

   b.   Arrival rate of telephone calls at a telephone booth are according to Poisson distribution with an average of 12 min between two consecutive call arrivals.   8M
The length of telephone calls is assumed to be exponentially distributed with a mean of 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