AR13

CODE: 13BS2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, November-2016

COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to CIVIL & MECH.)

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

PART-A

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

1. a) Define continuity of a complex variable function
   b) Define singular point
   c) Write the poles of $\cot z$
   d) State Cauchy's residue theorem
   e) Define bilinear transformation
   f) Define rotation
   g) State any two applications of Poisson distribution
   h) Find the value of the population Correction factor for n=10 and N=1,000
   i) Define critical region
   j) Find the value of $F_{0.95}$ for $\gamma_1 = 10$ and $\gamma_2 = 20$ degrees of freedom

PART-B

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

UNIT-I

2. a) Show that $f(z) = z + 2\bar{z}$ is not analytic anywhere in the complex plane [6 M]
   b) Find the analytic function whose real part is $\frac{x}{x^2 + y^2}$ [6 M]

(OR)

3. a) Show that $u = 2\log(x^2 + y^2)$ is harmonic [6 M]
   b) Evaluate $\int \frac{e^{2z} dz}{(z+1)^4}$ around the circle $|z-1| = 3$ by Cauchy's integral formula [6 M]

UNIT-II

4. a) Explain isolated singularity with an example [6 M]
   b) Evaluate $\int \frac{3\sin z \, dz}{z^2 - \frac{\pi^2}{4}}$ around the circle $|z| = \pi$ by Residue theorem [6 M]

(OR)

5. Evaluate $\int_0^\infty \frac{dx}{(x^2 + a^2)^2}$ [12M]

UNIT-III

6. Find the bilinear transformation which maps the point (- i,0,i) into the point (-1,i,1) [12M]

(OR)

7. a) Show that the transformation $w = \frac{z-i}{z+i}$ maps the real axis in the z-plane into the unit circle $|w| = 1$ in w- plane [6 M]

b) Show that the image of the hyperbola $x^2 - y^2 = 1$ under the transformation $w = \frac{1}{z}$ is a lemniscate [6 M]

UNIT-IV

8. a) The probabilities of a Poisson variate taking the values 1 and 2 are equal. Find [6 M]

(i) μ (ii) $p(x \geq 1)$ (iii) $p(1 < x < 4)$

b) In a test on 2000 electric bulbs, it was found that the life of a particular make was normally distributed with an average life of 2040 hours and S.D. of 60 hours. Estimate the number of bulbs likely to burn for more than 2150 hours [6 M]

(OR)

9. a) Find mean and variance for Binomial distribution [6 M]

b) A random sample of size 100 is taken from an infinite population having the mean 76 and the variance 256. What is the probability that the sample mean will be between 75 and 78 [6 M]

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 a mean of 11 minutes and the variance of 16 minutes. Test the significance at 0.05 level [6 M]

b) An airline claims that only 6% of all lost luggage is never found. If, in a random sample, 17 of 200 pieces of lost luggage are not found, test the null hypothesis p = 0.06 against the alternate hypothesis p > 0.06 at 0.(LOS. [6 M]

(OR)

11. A study shows that 16 of 200 tractors produced on one assembly line require extensive adjustments before they could be shipped, while the same was true for 14 of 400 tractors produced on another assembly line. At the 0.01 level of significance, does this support the claim that the second production line does superior work? [12M]

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AR13

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, November-2016

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 cut-in voltage values for Si and Ge at room temperature.
   b) Draw the V-I characteristics of ideal P-N junction diode.
   c) Write the applications of varactor diode.
   d) Write the relation between α, β *and* γ of a transistor.
   e) Why NPN transistors are more preferred compared to PNP transistors?
   f) Why BJTs are called as bipolar and FETs as unipolar devices?
   g) Define the stability factor $s"$.
   h) Write the differences between amplifiers and oscillators.
   i) Differentiate between series and shunt mixing.
   j) Define pinch-off voltage, V_P.

PART-B

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

UNIT-I

2. (a) Classify the materials based on Energy band diagram and also compare the electrical properties of these materials. **6M**
   (b) State and explain Hall Effect. Derive the expression for Hall coefficient and list out the applications of Hall effect. **6M**

(OR)

3. (a) Write the diode current equation and explain the terms in it. Explain the V-I characteristics of Si & Ge diodes 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) Describe the working of LEDs and its V-I characteristics. List out the applications and advantages of LEDs. **6M**

(OR)

AR13

CODE: 13EC2007 **SET-1**

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 for different operating regions. **6M**

   (b) For a transistor in CE configuration, the values of α, I_B and reverse saturation current are 0.9,100 μA and 0.5 mA respectively. Calculate the values of **6M**

   (i) β *and* γ.

   (ii) collector and emitter currents.

(OR)

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

   (b) Write a short notes on : **6M**

   (i) JFET as a voltage variable resistor

   (ii) SCR characteristics

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**

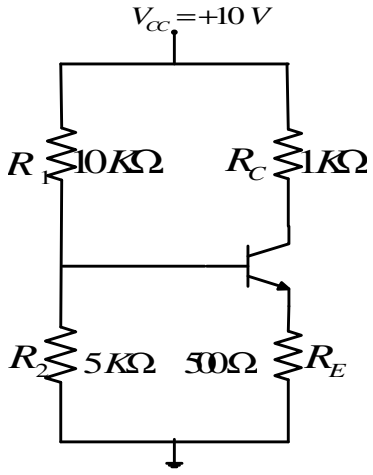

Fig.2

   (b) What is meant by thermal runaway? Derive the condition to avoid thermal runaway in a transistor. **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) Explain the graphical determination of h-parameters of a transistor from its input and output characteristics. **6M**

UNIT-V

10. (a) Classify the amplifiers based on nature of the input and output signals of interest. Draw the equivalent circuit diagrams for voltage-shunt and current-series amplifiers. **6M**
    (b) Explain the effect of negative feedback on the characteristics of amplifiers. **6M**

(OR)

11. (a) Draw the circuit diagram of a wein's bridge oscillator using BJT and derive the expression for sustained frequency of oscillations. **6M**
    (b) Draw the circuit diagram of a Hartley oscillator using BJT and derive the expression for sustained frequency of oscillations. **6M**

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AR13

CODE: 13EC2002 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, November-2016

ELECTRONIC CIRCUITS-I
(ELECTRONICS AND COMMUNICATION ENGINEERING)

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

PART-A

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

1. a) What is the need for a filter in rectifier?
   b) Mention advantages and disadvantages of HWR and FWR.
   c) What is FET and its application.
   d) Why do you call FET as field effect transistor.
   e) What is the typical value of h_{ie}?
   f) What are the units for h_{11} and h_{22} ?
   g) Mention the characteristics of ideal voltage amplifier.
   h) Explain millers effect.
   i) Why emitter is always forward biased with respect to base?
   j) Why CC configuration seldom used?

PART-B

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

UNIT-I

2. a Explain Π and T section filters **6M**
   b Explain LC filter. **6M**

(OR)

3. a Explain multiple L-section filter and multiple π-section filter. Design a CLC (or) π-section filter for V_{dc} = 10V, I_L = 200mA and y=2% . **6M**
   b Compare all filters. **6M**

UNIT-II

4. a Explain self-bias method and list its merits and de-merits. **6M**
   b What are the types of bias compensation and explain it. **6M**

(OR)

5. a Design a self-bias circuit for the following specifications.V_{cc}=12V, V_{CE}=2V, I_C=4mA, h_{fc}=80. **6M**
   b Why FET is called as a voltage controlled device. **6M**

AR13

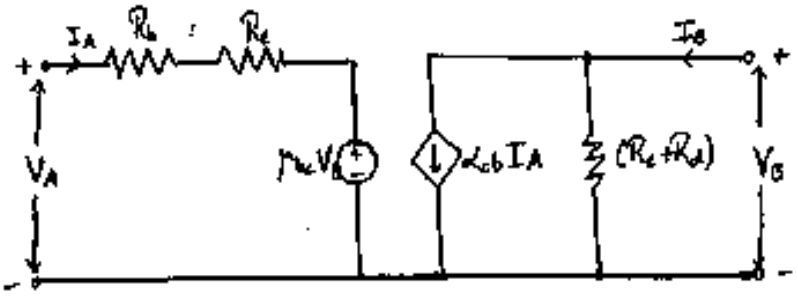
CODE: 13EC2002 **SET-2**

UNIT-III

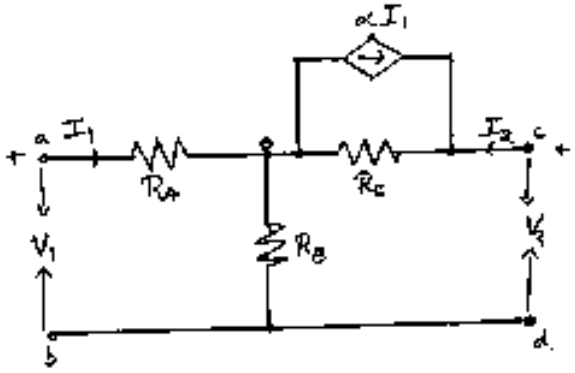
6.	**a**	**Explain the parameters of CE, CB, CC configurations using h-parameters.**	**6M**
	b	**Explain about small signal model analysis.**	**6M**

(OR)

7.	**a**	**Find the h-parameters of the following CE transistor equivalent circuit.**	**6M**



	b	**Find the hybrid parameters of the following circuit.**	**6M**



UNIT-IV

8.	**a**	**Explain about dual of millers theorem.**	**6M**
	b	**Explain common source amplifier of single stage amplifier.**	**6M**

(OR)

9.	**a**	**Explain common drain amplifier of single stage amplifier.**	**6M**
	b	**Draw emitter follower circuit and explain its operation comparing with others.**	**6M**

UNIT-V

10.	**a**	**Explain about common source amplifier at high frequency analysis.**	**6M**
	b	**Explain CE short circuit gain, current gain with resistive load.**	**6M**

(OR)

11.	**a**	**Explain hybrid-π conductance and capacitance.**	**6M**
	b	**Explain about common chain amplifier at high frequency analysis.**	**6M**

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AR13

CODE: 13BS2006 **SET1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, November-2016

PROBABILITY AND STATISTICS
(CSE & IT)

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

PART-A

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

1.a) Define Conditional Probability
b) Define Distribution function of a continuous random variable
c) State any two properties of Normal Distribution
d) Define Population and give example
e) Define Null Hypothesis
f) Find the value of the finite population correction factor for n = 10 and N = 1000
g) What is small sample
h) Define critical region
i) Define positive Correlation and give example
j) Define pure birth process.

PART – B

Answer one question from each unit [**5 x 12 = 60M**]

UNIT - I

2 a) If P(A) = ½, P(B) = 1/3 and $P(A \cap B) = 1/5$ then find (i) $P(A \cup B)$
(ii) $P(A^C \cap B)$ (iii) $P(A \cap B^C)$
b) If X is a continuous random variable and Y = aX+b, then prove that E(Y) = a E(X) +b and $V(Y) = a^2$. V(X) where V denotes variance and a, b are constants. [6M+6M]

(OR)

3.a) State and prove Baye,s theorem
b) The diameter of an electric cable is assumed to be a continuous variant with P.D.F f(x) = 6x(1-x), $0 \le x \le 1$ verify that the given f(x) is a P.D.F . Also find the mean and variance. [6M+6M]

UNIT - II

4. a) Define Binomial Distribution and find its mean and variance
b) If the amount of cosmic radiation to which a person is exposed while flying by jet across the United States is a random variable having normal distribution with mean $\mu = 4.35$ mrem and standard deviation $\sigma = 0.59$ mrem. Fi nd the probabilities that the amount of cosmic radiation to which a person will be exposed on such flight is (i) between 4.00 and 5.00 mrem and (ii) atleast 5.50 mrem. [6M+6M]

(OR)

5.a) If a Poisson distribution is such that $\frac{3}{2}$ P(X = 1) = P(X=3), find
(i) $P(X \ge 1)$ and (ii) $P(X \le 3)$
b) The amount of time, in hours, that a computer functions before breaking down is an exponential random variable with $\lambda = 1/100$.
(i) What is the probability that a computer will function between 50 and 150 hours before breaking down?
(ii) What is the probability that it will function less than 100 hours? [6M+6M]

CODE: 13BS2006 **SET1**

UNIT – III

6. a) Explain Type I error, Type II errors with examples

b) The following random samples are measurements of the heat – producing capacity (in millions of calories per ton) of specimens of coal from two mines

Mine I	8260	8130	8350	8070	8340	……
Mine II	7950	7890	7900	8140	7920	7840

Use the 0.01 level of significance to test whether the difference between the means of these two samples is significant. [6M+6M]

(OR)

7) As part of the investigation of the collapse of the roof of a building, a testing laboratory is given all the available bolts that connected the steel structure at 3 different positions on the roof. The forces required to shear each of these bolts (coded values) are as follows:

Position I	90	82	79	98	83	91	
Position II	105	89	93	104	89	95	86
Position III	83	89	80	94			

Perform an analysis of variance to test at the 0.05 level of significance whether the differences among the sample means at the 3 positions are significant **[**12M**]**

UNIT –IV

8.a) The ranks of 60 students in Mathematics and Statistics are as follows (1,1) (2,10) (3,3) (4,4) (5,5) (6,7) (7,2) (8,6) (9,8) (10,11) (11,15) (12,9) (13,14) (14,12) (15,16) (16,13) Calculate the Spearman's rank correlation coefficient for proficiencies of this group in mathematics and statistics.

b) Calculate the regression equations of Y on X from the data given below, taking deviations from actual means of X and Y

Price rs)	10	12	13	12	16	15
Amount Demanded	40	38	43	45	37	43

Estimate the likely demand when the price is Rs. 20 [6M+6M]

(OR)

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

X	48	33	40	9	16	16	65	24	16	57
Y	13	13	24	6	15	4	20	9	16	19

b) Explain about Fraction – Defective Chart and its method [6M+6M]

UNIT –V

10. a) What is queuing problem? Explain pure birth and death birth process.

b) 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 number of customers in the system, (ii) the average queue length,

(iii) average time a customer spends in the system. [6M+6M]

(OR)

11. a) Define queue system, arrival pattern, service pattern, the queue discipline and queue behaviour.

b) A toll gate is operated on a frequency where car 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) idle time of the counter (ii) average number of cars in the system (iii) the average number of cars in the queue (iv) average time that a car spends in the system [6M+6M]

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