

Code: 13BS2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March, 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) Give the Cauchy – Riemann equations of a complex valued function.
- b) Determine the singular point of the function $w = \log z$.
- c) State Cauchy's theorem.
- d) Find the nature and location of singularity of $f(z) = \frac{e^{iz}}{z^2}$.
- e) State Residue theorem.
- f) Find the fixed points of the transformation $w = \frac{z-1}{z+1}$.
- g) Define Discrete Random variable.
- h) A fair coin is tossed six times. Find the probability of getting four heads.
- i) Define Null hypothesis.
- j) Write uses of F-test.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) If $f(z) = u + iv$ is an analytic function, then show that both u and v are harmonic functions.

- b) Determine the analytic function whose real part is $y + e^x \cos y$.

[6M+6M]

(OR)

3. a) Find the conjugate harmonic of $f(z) = u + iv$ if $v = r^2 \cos 2\theta - r \cos \theta + 2$.

- b) Evaluate $\int_C \frac{\sin^2 z}{(z-f/6)^3} dz$ where C is the circle $|z|=1$.

[6M+6M]

UNIT-II

4. a) Evaluate $\int_C \frac{e^z}{(z^2 + f^2)^2} dz$ where C is $|z|=4$ using Residue theorem.

- b) Determine the singularity of the function $\frac{e^{1/z}}{z^2}$.

[8M+6M]

(OR)

5. Using complex variable technique evaluate $\int_0^{2\pi} \frac{e^{i2\theta}}{5-4\cos\theta} d\theta$

[12M]

UNIT-III

6. Find the bilinear transformation which maps the points $(1, i, -1)$ onto the points $(i, 0, -i)$.
Hence find
(i) the image of $|z| < 1$ (ii) the invariant or fixed points of this transformation. [12M]
(OR)
7. a) Find the image of the region common to $1 < x < 2$ and $2 < y < 3$ under the mapping $w = e^z$.
b) Show that the transformation $w = \frac{5-4z}{4z-2}$ transforms the circle $|z| = 1$ into a circle of radius unity in w – plane. [6M+6M]

UNIT-IV

8. a) The contents of urns I, II, III are as follows
1 White, 2 Black, and 3 Red balls
2 White, 1 Black, and 1 Red balls, and
4 White, 5 Black and 3 Red balls.
one urn is chosen at random and two balls drawn from it. They happen to be white and red .
What is the probability that they come from urns I, II, III?
b) The average number of phone calls/minute coming into switch board 2 p.m and 4p.m is 2.5. Determine the probability that during one particular minute there will be
(i) 4 or fewer (ii) more than 6 call [6M+6M]

(OR)

9. a) Derive mean and variance of Normal Distribution.
b) Fit the Binomial Distribution for the following data and calculate the expected frequencies

X	0	1	2	3	4	5	6
F(x)	13	25	52	58	32	16	4

[6M+6M]

UNIT-V

- 10.a) Explain one Tailed and Two tailed tests.
b) The mean and standard deviation of a population are 11,795 and 14054 respectively if $n=50$ find 95% confidence limits for the mean. [6M+6M]
(OR)
11. To determine whether there really is a relationship between an employer's performance in the company's training program and his or her ultimate success in the job, the company takes a sample of 400 cases from its very extensive files and obtain the results shown in the following table.

Performance in training programme

Success in job (employee's rating)	Below average	average	Above Average	Total
Poor	23	60	29	112
Average	28	79	60	167
Very good	9	49	63	121
Total	60	188	152	400

Use the 0.01 level of significance to test the null hypothesis that performance in the training program and success in the job are independent. [12M]

Code: 13EC2007**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****II B.Tech I Semester Supplementary Examinations, March, 2015
ELECTRONIC DEVICES AND CIRCUITS
(ELECTRICAL & ELECTRONICS ENGINEERING)****Time: 3 hours****Max. Marks: 70****PART-A****Answer all Questions****[10X1=10M]**

1. (a) What is fermi level?
(b) Expression for diode dynamic resistance.
(c) Draw the equivalent circuit of Tunnel diode.
(d) What are advantages of half wave rectifier over full wave rectifier?
(e) What is early effect?
(f) Draw the equivalent circuit of UJT.
(g) What is the difference between stabilization and compensation.
(h) Write the typical h-parameter values of an CB configuration.
(i) Which type of feedback is used in oscillators?
(j) What is the phase shift provided by CE amplifier?

Part-B**Answer one question from each unit****[5X12=60M]****UNIT – I**

2. a) Explain the conductivity of extrinsic semiconductor. (6M)
b) Explain the diode characteristics from diode equation. (6M)
(OR)
3. a) Explain i) drift current ii) diffusion current. (6M)
b) With the help of neat sketches explain the energy band diagram of p-n Junction. (6M)

UNIT – II

4. a) Write short notes on i) varactor diode ii) LED (6M)
b) Derive the expressions for ripple factor in L-section filter for full wave rectifier. (6M)
(OR)
5. a) Draw and explain the V-I characteristics of zener diode. (6M)
b) Explain the operation of half wave rectifier with waveforms. (6M)

UNIT – III

6. a) Explain the different current components in transistor. (6M)
b) Explain the characteristics of UJT. (6M)
(OR)
7. a) Explain the output characteristics of a transistor in CB configuration. (6M)
b) Explain the working operation of SCR. (6M)

UNIT – IV

8. a) What is the need of biasing. (6M)
b) Explain how h-parameters are determined from transistor characteristics. (6M)
(OR)
9. a) Write short notes on i) Thermistor compensation ii) Sensistor compensation. (6M)
b) Draw the h-parameter model for CE configuration. Derive the expression for voltage gain and output impedance of a general transistor amplifier. (6M)

UNIT – V

10. a) Explain the block diagram of an amplifier with feedback. Derive the expression for overall gain for negative feedback amplifier. (8M)
b) Explain in detail about Barkhausen conditions for oscillation. (4M)
(OR)
11. a) Derive the input resistance and output resistance of voltage series feedback amplifier. (6M)
b) Derive the expression for frequency of oscillations in Hartley oscillator. (6M)

CODE : 13EC2002**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****II B.Tech I Semester Supplementary Examinations, March, 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 input choke filter?
b) What is meant by Regulation?
c) What are the disadvantages of Capacitor filter?
d) What is meant by Q-point?
e) Define Stability factor?
f) What is Thermal runaway effect?
g) What are the applications of a CE amplifier?
h) Define Miller's theorem?
i) What are the advantages of JFET amplifier?
j) Why gain of a bipolar transistor drops at high frequencies?

PART – B**Answer one question from each unit****[5X12=60M]****UNIT – I**

2. a) Explain the working operation of FWR with L-section filter and derive ripple factor expression?
b) Explain how zener diode can be used as a voltage regulator?

[6M+6M]**(OR)**

3. a) Explain the working operation of FWR with shunt capacitor filter and derive ripple factor expression?

- b) A single phase FWR makes use of π -section filter with two $10\mu\text{F}$ capacitors and a choke of 10H . The secondary voltage is 280V_{rms} with respect to centre tap. If the load current is 100mA , determine the dc output voltage and percentage ripple in the output. Assume Supply frequency of 50Hz .

[6M+6M]

UNIT -II

- 4.a) Draw the circuit diagram of collector to base bias and derive the expression for S ?
b) Assume that a silicon transistor with $\beta=50$, $V_{BE}=0.6V$ and $V_{CC}=20V$ and $R_C=4.7K$ is used in a self-biased circuit. It is desired to establish a Q-point at $V_{CE}=8V$ and $I_C=2\text{ mA}$ and $S \leq 5$. Design the circuit with all component values. [4M+8M]
(OR)
5. a) Explain about Bias compensation techniques with circuit diagrams ?
b) Explain Voltage divider bias circuit by using FET. [8M+4M]

UNIT-III

6. a) A BJT has the following h-parameters: $h_{ie}=2,000$; $h_{re}=16 \times 10^{-5}$; $h_{fe}=49$ and $h_{oe}=50\mu A/V$. Determine input resistance, current gain, voltage gain, and output resistance of the CE amplifier if the load resistance is $30K$.Neglect source resistance.
b) What are the advantages and Limitations of h-parameters? [8M+4M]
(OR)
7. a) Find CE parameters in terms of the CC parameters
b) If $h_{ie}=1,500$, $h_{fe}=99$, what is h_{ib} and h_{ic} ? [8M+4M]

UNIT-IV

8. a) Explain FET amplifiers in common source configuration.
b) Explain dual of Miller's theorem in detail? [6M+6M]
(OR)
9. a) Explain the Common Emitter transistor Amplifier circuit and Derive expressions for voltage gain, current gain, input impedance and output impedance by using h-parameters.
b) Briefly explain Emitter follower. [8M+4M]

UNIT-V

10. a) Derive the equation for CE short circuit current gain.
b) Explain the concept of gain bandwidth product. [6M+6M]
(OR)
11. a) With all necessary equations explain the common drain FET amplifier at high frequencies.
b) Explain the parameters of High frequency Hybrid- common emitter transistor model. [6M+6M]

AR13**Set 01****Code: 13BS2006****ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****II B.Tech I Semester Supplementary Examinations, March, 2015****PROBABILITY AND STATISTICS****(Common to CSE & IT.)****Time: 3 hours****Max. Marks: 70****PART-A****Answer all Questions****[10X1=10M]**

1. a) What is a sample space.
- b) Define conditional probability.
- c) What is moment generating function of a binomial distribution.
- d) Define the variance of the sampling distribution of means in finite population.
- e) Define Type-I and Type-II errors.
- f) What is ANOVA for one-way classification.
- g) What is correlation?
- h) What is statistical quality control
- i) What is pure birth process?
- j) Write any two characteristics of (M/M/1): (∞ /FIFO)(∞ /FCFS) model.

PART-B**Answer one question from each unit****[5X12=60M]****UNIT-I**

- 2.a) A card is drawn from a well shuffled pack of cards. What is the probability that it is either a spade or an ace?
- b) Given that $f(x) = K/2x$, is a probability distribution for a random variable 'X' that can take on the values $X = 0, 1, 2, 3, 4$.

- (i) Find K (ii) Mean and variance of 'X'

[6M+6M]**(OR)**

3. a) If 'X' is a continuous random variable and 'K' is a constant then prove that (i) $\text{Var}(X+K) = \text{Var}(X)$ (ii) $\text{Var}(KX) = K^2 \text{Var}(X)$.

- b) If the probability density function of a random variable 'X' is given by $f(x) = 2/x^4$, $1 < x < \infty$
0, otherwise. Find mean

[6M+6M]

UNIT-II

4. a) Define poisson distribution and find its mean and variance.
 b) If a 1-gallon can of paint covers on an average 513 square feet with a standard deviation of 31.5 square feet, what is the probability that the mean area covered by a sample of 40 of these 1-gallon cans will be anywhere from 510 to 520 square feet? [6M+6M]

(OR)

5. a) If the masses of 300 students are normally distributed with mean 68 kgs and S.D. 3 Kgs, how many students have masses
 (i) Greater than 72 Kg
 (ii) Less than or equal to 64 Kg
 (iii) Between 65 and 71 Kg inclusive.
 b) If X is a normal variate with mean 30 and S.D 5. Find the probability that (i) $P(26 < X < 40)$ (ii) $P(X < 45)$. [6M+6M]

UNIT-III

6. a) The mean yield of wheat from a district 'A' was 210 pounds with S.D.10 pounds per acre from a sample of 100 plots. In another district the mean yield was 220 pounds with S.D. 12 pounds from a sample of 150 plots. Assuming that the S.D. of yield in the entire state was 11 pounds, test whether there is any significance difference between the mean yield of crops in the two districts.
 b) A mechanist is making engine parts with axle diameters of 0.700 inch. A random sample of 10 parts shows a mean diameter of 0.742 inch with a S.D. of 0.040 inch. Complete the statistic you would use to test whether the work is meeting the specification. [6M+6M]

(OR)

7. The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal population at 10% significant level, test whether the two populations have the same variance.

Unit-A	14.1	10.1	14.7	13.7	14.0
Unit-B	14.0	14.5	13.7	12.7	14.1

[12M]

UNIT-IV

8. a) The following data gives readings 10 samples of size 6 each in the production of a certain component

Sample	1	2	3	4	5	6	7	8	9	10
Mean	383	508	505	582	557	337	514	614	707	753
Range R	95	128	100	91	68	65	148	28	37	80

Draw control charts for \bar{X} (for $n=6$, $A_2=0.483$).

What is your conclusion?

- b) Calculate Karl Pearson's Correlation coefficient for the following paired data

X	28	41	40	38	35	33	40	32	36	33
Y	23	34	33	34	30	26	28	31	36	38

[6M+6M]

(OR)

9. a) Samples of 100 tubes are drawn randomly from the output of a process that produces several thousand units daily. Sample items are inspected for quality and defective tubes are rejected.

The results of 15 samples are shown below:

Sample No.	No. of Defectives tubes	Sample No.	No. of Defectives tubes
1	8	9	10
2	10	10	13
3	13	11	18
4	9	12	15
5	8	13	12
6	10	14	14
7	14	15	9
8	6		

Prepare a control chart for fraction defective (P-chart). What conclusion do you draw from the control chart?

- b) By the method of least squares fit a parabola of the form $y=a+bx+cx^2$ for the following data:

X	2	4	6	8	10
Y	3.07	12.85	31.47	57.38	91.29

[6M+6M]

UNIT-V

10. a) A TV repair man finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. He repairs sets in the order in which they arrive. The arrival of the sets is approximately poisson with an average of 10 per an eight hour day. Find the repairman's idle time each day. How many jobs are ahead of the average set just brought in?
- b) A car park contains 5 cars. The arrival of cars in poisson with a mean rate of 10 per hour. The length of time each car spends in the car park has negative exponential distribution with mean of 2 hours. How many cars are in the car park on a average and what is the probability of a newly arriving customer finding the car park full and having to park his car elsewhere?

[6M+6M]

(OR)

11. A fast food restaurant has one drive-in window. It is estimated that cars arrive according to a poisson distribution at the rate of 2 every 5 minutes and that there is enough space to accommodate a line of 10 cars. Other arriving cars can wait outside this space, if necessary. It takes 15 minutes on the average to fill an order, but the service time actually varies according to an exponential distribution. Determine the following
- The probability that the facility is idle.
 - The expected number of customers waiting to be served.
 - Effective arrival rate.
 - The time a customer expects to spend in the system.

[12M]

Subject: PROBABILITY AND STATISTICS (13BS2006)

Note: Unit – II, Question Number: 5

b) If X is a normal variate with mean 30 and S.D 5. Find the probability that (i) $P(26 < X < 40)$ (ii) $P(X < 45)$.

Subject: PROBABILITY AND STATISTICS (13BS2006)

Note: Unit – II, Question Number: 5

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