Code No: RT21012 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
PROBABILITY AND STATISTICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
4. Statistical tables are required

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PART –A

1. a) Define a Random variable and Distribution function. (4M)
   b) Find Moment Generating Function for normal distribution. (3M)
   c) Define point estimator and unbiased estimator. (4M)
   d) Write χ^2 statistic for analysis of $r \times c$ table. (4M)
   e) Write normal equations to fit the second degree parabola $y = a + bx + cx^2$. (4M)
   f) Write the control line and three - sigma limits for the range chart. (3M)

PART –B

2. a) Define the Weibull Distribution and find its mean and variance. (8M)
   b) Find the value of k and the distribution function $F(x)$ given the probability density function of a random variable X as: (8M)

$$f(x)=\begin{cases} k(3+2x) & if\ 0<x<2 \\ 0 & otherwise \end{cases}.$$

3. a) Define Mathematical Expectation and write its properties. (8M)
   b) Find Moment Generating Function for Binomial distribution. (8M)

4. A population consists of five numbers 2, 3, 6, 8 and 11. Consider all possible samples of size 2 that can be drawn with replacement from this population. Find (16M)
   a) The mean of the population.
   b) The standard deviation of the population.
   c) The mean of the sampling distribution of means and
   d) The standard deviation of the sampling distribution of means

5. Test of the fidelity and the selectivity of 190 digital radio receivers produced the results shown in the following table: (16M)

		Fidelity		
		Low	Average	High
Selectivity	Low	6	12	32
	Average	33	61	18
	High	13	15	0

Use the 0.01 level of significance to test whether there is a relationship between fidelity and selectivity.
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6. The following are measurements of the air velocity and evaporation coefficient of burning fuel droplets in an impulse engine: (16M)

Air velocity (cm/s) x	Evaporation coefficient (mm^2/s) y
20	0.18
60	0.37
100	0.35
140	0.78
180	.056
220	.075
260	1.18
300	1.36
340	1.17
380	1.65

Fit a straight line to these data by the method of least squares and use it to estimate the evaporation coefficient of a droplet when the air velocity is 190 cm/s.

7. The following means and ranges, obtained in 20 successive random samples of size 5. (16M)

Sample	$\overline{X}$	R	**Sample**	$\overline{X}$	R
1	4.24	0.09	**11**	4.20	0.21
2	4.18	0.12	**12**	4.25	0.20
3	4.26	0.14	**13**	4.25	0.17
4	4.21	0.24	**14**	4.21	0.07
5	4.22	0.15	**15**	4.19	0.16
6	4.18	0.28	**16**	4.23	0.16
7	4.23	0.06	**17**	4.27	0.19
8	4.19	0.15	**18**	4.22	0.20
9	4.21	0.09	**19**	4.20	0.12
10	4.18	0.15	**20**	4.19	0.16

(a) Use these data to find the central line and control limits for an $\overline{X}$ chart.
(b) Use these data to find the central line and control limits for an R chart.
(c) Plot the given data on $\overline{X}$ and R charts based on the control chart constants computed in parts (i) and (ii), and interpret the results.

Note :- Statistical tables and Control Chart Constants are required

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Code No: RT21012 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
PROBABILITY AND STATISTICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
4. Statistical tables are required

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PART –A

1. a) Define Gamma distribution and find its Mean. (4M)
   b) Find Moment Generating Function for Poission distribution. (3M)
   c) Define Population and Sample with examples. (4M)
   d) Define Type-I and Type-II errors in testing of hypothesis. (4M)
   e) Explain Multiple Regression. (4M)
   f) Define Quality control. (3M)

PART –B

2. a) Define continuous random variable and continuous probability distribution. (8M)
   b) Find the probabilities that a random variable having the standard normal distribution will take on a value (8M)
      i) between 0.87 and 1.28;
      ii) between -0.87 and 0.62;
      iii) greater than 0.85;
      iv) greater than -0.65.

3. Find Moment Generating Function for Poisson distribution and hence find its mean and variance. (16M)

4. a) Determine the probability that $\overline{X}$ will be between 22.39 and 22.41 if a random sample of size 36 is taken from an infinite population having the mean $\mu = 22.4 \, and \, \sigma = 0.048$. (8M)
   b) Explain briefly the following : (8M)
      i) Point Estimation
      ii) Interval Estimation
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5. Five treatments are used on four types of fabrics and the linear shrinkage percentage is assessed in each case. Each fabric of certain length is made into five pieces and the five treatments are randomly used. The data from this experiment are than arranged as given in the following table. It is assumed that there is no significant interaction between treatment and fabric. Perform ANOVA to test whether there is any significant difference between treatments and between fabrics. (16M)

Treatment	Fabric			
	1	**2**	**3**	**4**
1	17.6	19.6	18.4	19.8
2	19.2	20.4	19.8	20.7
3	17.2	19.0	17.1	17.3
4	17.0	20.1	17.1	17.7
5	17.4	18.8	17.8	16.5

6. a) The following data pertain to the cosmic ray doses measured at various altitudes: (8M)

Altitude(feet) x	50	450	780	1200	4400	4800	5300
Count y	28	30	32	36	51	58	69

Fit an exponential curve.

b) Find the Correlation Coefficient for the following data: (8M)

x	1	2	3	4	5
y	2	5	3	8	7

7. The following data give the means and ranges of 25 samples, each consisting of 4 compression test results on steel forgings, in thousands of pounds per square inch:

Sample	$\overline{X}$	R	**Sample**	$\overline{X}$	R
1	45.4	2.7	**14**	49.2	3.1
2	48.1	3.1	**15**	51.1	1.5
3	46.2	5.0	**16**	42.8	2.2
4	45.7	1.6	**17**	51.1	1.4
5	41.9	2.2	**18**	52.4	4.3
6	49.4	5.7	**19**	47.9	2.2
7	52.6	6.5	**20**	48.6	2.7
8	54.5	3.6	**21**	53.3	3.0
9	45.1	2.5	**22**	49.7	1.1
10	47.6	1.0	**23**	48.2	2.1
11	42.8	3.9	**24**	51.6	1.6
12	41.4	5.6	**25**	52.3	2.4
13	43.7	2.7			

(a) Use these data to find the central line and control limits for an $\overline{X}$ chart.
(b) Use these data to find the central line and control limits for an R chart.
(c) Plot the given data on $\overline{X}$ and R charts based on the control chart constants computed in parts (i) and (ii), and interpret the results. (16M)

Note :- Statistical tables and Control Chart Constants are required

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Code No: RT21012 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
PROBABILITY AND STATISTICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
4. Statistical tables are required

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PART –A

1. a) Given the probability density function of a random variable X as: (4M)

$$f(x)=\frac{k}{x^2+1},\ -\infty<x<\infty, \text{ find } k.$$

b) Find the probability of getting a total of 5 at least once in three toses of pair of fair dice? (3M)

c) Find the value of the finite population correction factor for n= 100 and N= 5000. (4M)

d) Define simple correlation and write formula for simple correlation coefficient. (4M)

e) Construct a two-way Classification of analysis of variance table. (4M)

f) Write the control line and three - sigma limits for the fraction-defective chart. (3M)

PART -B

2. a) Let X be a continuous random variable with distribution : (8M)

$$f(x)=\begin{cases} k\,x^2 & if\ 0\le x\le 1 \\ 0 & elsewhere \end{cases}$$

(i) Evaluate k (ii) Find $p(1/4\le X\le 3/4)$. (iii) Find $p(X>2/3)$.

b) Define the Gamma Distribution and find its mean and variance. (8M)

3. Find Moment Generating Function for Binomial distribution and hence find its mean and variance. (16M)

4. a) Take 30 slips of paper and label five each -4 and 4,four each -3 and 3,three each -2 and 2, and two each -1,0 and 1.If each slip of paper has the same probability of being drawn , find the probability of getting $-4,-3,-2,-1$, 0, 1, 2, 3, 4 and find the mean and the variance of this distribution. (8M)

b) Determine a 99% confidence interval for the mean of a normal distribution with variance $\sigma^2=9$, using a sample of $n=100$ values with mean $\bar{x}=5$. (8M)
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5. To determine whether there really is a relationship between an employee's performances 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 obtains the results shown in the following table: (16M)

		Performance in training program			
		Below Average	Average	Above Average	Total
Success in job (employer's rating)	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.

6. The following data pertain to the demand for a product (in thousands of units) and its price (in dollars) charged in five different market areas: (16M)

Price	x	20	16	10	11	14
Demand	y	22	41	120	89	56

Fit a power function and use it to estimate the demand when the price of the product is 12 dollars

7. During an inspection, 20 of successively selected samples of polished metal sheet, the number of defects observed per sheet is recorded, as shown in the following table. Construct a C-chart for the number of defects. (16M)

Sample no.	**No. of defects**	**Sample no.**	**No. of defects**
1	3	**11**	5
2	0	**12**	2
3	5	**13**	1
4	1	**14**	1
5	2	**15**	2
6	3	**16**	3
7	2	**17**	4
8	4	**18**	0
9	0	**19**	1
10	2	**20**	2

Note :- Statistical tables and Control Chart Constants are required

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Code No: RT21012 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
PROBABILITY AND STATISTICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
4. Statistical tables are required

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PART –A

1. a) If the Probability density of a random variable is given by (4M)

$$f(x)=\begin{cases} k\,x^2 & 0<x<1 \\ 0 & elsewhere \end{cases}$$

Find the value of k.

b) Define Moment Generating Function. (3M)

c) Define one-tailed and two-tailed tests. (4M)

d) Construct a one-way Classification of analysis of variance table. (4M)

e) Derive normal equations to fit the straight line $y = a + bx$. (4M)

f) Write the control line and three - sigma limits for the mean chart. (3M)

PART -B

2. a) Given that $f(x)=\frac{k}{2^x}$ is a probability distribution for a random variable that can take on the values $x = 0,1,2,3,4$. (8M)

(i) Find the value of k.
(ii) Find an expression for the distribution function $F(x)$ of the random variable.

b) An aptitude test for selecting offers in a bank is conducted on 1000 candidates. The average score is 42 and the standard deviation of score is 24. Assuming normal distribution for the scores, find (8M)

(i) The number of candidates whose scores exceed 60
(ii) The number of candidates whose scores lie between 30 and 60.

3. Find Moment Generating Function for normal distribution and hence find its mean and variance. (16M)

4. a) 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? (8M)

b) Find the value of $F_{0.99}$ for $\nu_1 = 6$ *and* $\nu_2 = 20$ degrees of freedom. (8M)
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5. a) A study of TV viewers was conducted to find the opinion about the mega serial 'Ramayana'. If 56% of a sample of 300 viewers from south and 48% of 200 viewers from north preferred the serial, , test the claim at 0.05 level of significance that there is a difference of opinion between south and north. (8M)

   b) Explain the test procedure for small sample test concerning difference between two means. (8M)

6. The following are data on the drying time of a certain varnish and the amount of an additive that is intended to reduce the drying time: (16M)

Amount of varnish additive (grams) x	0	1	2	3	4	5	6	7	8
Drying time (hours) y	12.0	10.5	10.0	8.0	7.0	8.0	7.5	8.5	9.0

(i) Fit a second degree polynomial by the method of least squares.
(ii) Use the result of (i) to predict the drying time of the varnish when 6.5 grams of the additive is being used.

7. Consider the following data taken on subgroups of size 5. The data contain 20 averages and ranges on the diameter (in millimeters) of an important component part of an engine. Display $\bar{X}$ and R Charts. Does the process appear to be in control? (16M)

Sample	$\bar{X}$	R		**Sample**	$\bar{X}$	R
1	2.3972	0.0052		**11**	2.3887	0.0082
2	2.4191	0.0117		**12**	2.4107	0.0032
3	2.4215	0.0062		**13**	2.4009	0.0077
4	2.3917	0.0089		**14**	2.3992	0.0107
5	2.4151	0.0095		**15**	2.3889	0.0025
6	2.4027	0.0101		**16**	2.4107	0.0138
7	2.3921	0.0091		**17**	2.4109	0.0037
8	2.4171	0.0059		**18**	2.3944	0.0052
9	2.3951	0.0068		**19**	2.3951	0.0038
10	2.4215	0.0048		**20**	2.4015	0.0017

Note :- Statistical tables and Control Chart Constants are required

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Code No: RT21023 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
BASIC ELECTRONICS AND DEVICES
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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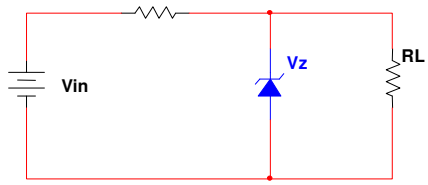
PART –A

1. a) What are meant by N-type impurity in semiconductor? (3M)
   b) List the application of photodiode (4M)
   c) what are the advantages of bridge rectifier (4M)
   d) Derive the relationship between α and β (4M)
   e) Write the difference between BJT and JFET (3M)
   f) Define feedback amplifier? How it classify (4M)

PART -B

2. a) Explain Hall Effect. How can Hall Effect be used to determine some of the properties of semiconductor? (8M)
   b) Prove that the conductivity of a semiconductor is given by, $\sigma = q(P\mu_p + n\mu_n)$. (8M)

3. a) Determine the range of input voltage that maintains the output voltage of 10V, for the regulator circuit shown (8M)



   b) Explain characteristics of tunnel diode with the help of energy band diagrams (8M)

4. a) derive expressions for rectification efficiency, ripple factor, transformer utilization factor, form factor, peak factor of a half-wave rectifier with resistive load (8M)
   b) A full wave rectifier supplies a load requiring 300V at 200mA. Calculate the transformer secondary voltage for (8M)
   (i) a capacitor input filter using a capacitor of 10mF, and (ii) a choke input filter using of 10H and a capacitor of 10μF.Neglect the resistance of choke

5. a) Explain how transistor is used as an amplifier (8M)
   b) Consider the self-bias circuit where V_{cc}=22.5V, R_c=5.6 kΩ, R2=10 kΩ and R1= 90 kΩ,h_{fe}=55,V_{BE}=0.6V.the transistor operates in active region. Determine (8M)
   (i) operating point (ii) stability factor

6. a) Explain principle of operation and characteristics of power IGBT (8M)
   b) Explain low frequency model of JFET (8M)

7. a) Why do need three RC networks for a phase shift oscillations? Can it be two or four? (6M)
   b) Draw the circuit diagram Push-full amplifiers and explain in detail (10M)

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Code No: RT21023 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
BASIC ELECTRONICS AND DEVICES
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What are meant by P-type impurity in semiconductor? (3M)
   b) List the application of LED (3M)
   c) compare full-wave rectifier and bridge rectifier (4M)
   d) What is Thermal runway? How can it be avoid? (4M)
   e) Write the difference between JFET and MOSFET (4M)
   f) Write the application of power amplifier (4M)

PART -B

2. a) State and explain Mass-action Law (8M)
   b) Compute the conductivity of a silicon semiconductor which is doped with acceptor impurity to a density of 10^{22} atoms/m^3. Given that $n_i = 1.4\times10^{16}/m^3$, $\mu_n = 0.145\,m^2/V-s$ and $\mu_p = 0.05\,m^2/V-s$. (8M)

3. a) Explain V-I characteristics of a PN junction diode (8M)
   b) Design a zener regulator for the following specifications: output voltage ,V_0=5V, load current,I_L =20mA,input voltage , V_i= 12V $\pm$ 3V, zener wattage ,P_z=500mW (8M)

4. a) Derive expressions for rectification efficiency, ripple factor, transformer utilization factor, form factor, peak factor of a full-wave rectifier with resistive load (8M)
   b) compare the performance of inductive, L-section and π-section filters (8M)

5. a) Explain how transistor is used as an switch (8M)
   b) Derive an expression for the stability factor of a CB bias circuit (8M)

6. a) Explain principle of operation and characteristics of SCR (8M)
   b) Explain how JFET as an amplifier (8M)

7. a) Explain the operation of wein-bridge oscillator with the help of neat circuit diagram. How is amplitude stability achieved in this circuit? (8M)
   b) Explain the operation Class C power amplifier with neat circuit diagram and its efficiency (8M)

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Code No: RT21023 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
BASIC ELECTRONICS AND DEVICES
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Write the difference between intrinsic and extrinsic semiconductors (3M)
   b) Explain the formation of depletion region in a PN junction (4M)
   c) What is the need for filters in power supplies? (4M)
   d) What is the need for biasing a transistor? (3M)
   e) Write the application of JFET (4M)
   f) Write the Condition for oscillations (4M)

PART –B

2. a) Derive the conductivity equation for an N-type and P-type semiconductor (8M)
   b) The mobility of electrons and holes in a sample of intrinsic germanium at room temperature are 0.36 m^2/V-s and 0.17 m^2/V-s, respectively. If the electron and hole densities are each equal to $2.5\times10^{19}/m^3$, calculate the conductivity (8M)

3. a) Explain about Avalanche break down in detail (8M)
   b) In a Zener regulator, the D.C input is $10V\pm20\%$,the output requirement are 5V, 20mA, Assume $I_{z(min)}$) and $I_{z(max)}$ as 5mA and 80mA respectively. Design the zener regulator (8M)

4. a) draw the circuit diagram of full-wave rectifier and explain its operation (8M)
   b) A bridge rectifier with capacitor filter is fed from 220V to 40V step-down transformer. If average d.c current is load is 1A and capacitor filter of 800μF, calculate the load regulation and ripple factor, assume power line frequency of 50Hz.neglect diode forward resistance and d.c resistance of secondary of transformer (8M)

5. a) Determine the h-parameters from the characteristics of CB configuration (8M)
   b) Explain about Bias Compensation in transistor (8M)

6. a) Explain principle of operation and characteristics of thyristor (8M)
   b) Explain about enhancement and depletion mode of MOSFET (8M)

7. a) Draw the circuit diagram of RC phase shift oscillator .drive of expression for frequency of oscillations (8M)
   b) Explain the operation Class A power amplifier with neat circuit diagram (8M)

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Code No: RT21023 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
BASIC ELECTRONICS AND DEVICES
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Define the terms conductivity and mobility in semiconductor (3M)
   b) Write the application of PN junction diode (4M)
   c) Compare half-wave and full-wave rectifier (4M)
   d) What is relation between I_B, I_E and I_C in CB configuration? (4M)
   e) What is MOSFET? How many types of MOSFETs are their? (4M)
   f) Write the difference between the positive feedback and negative feedback amplifier (3M)

PART -B

2. a) Describe applications of Hall effect (8M)
   b) A crystal of pure germanium has sufficient antimony added to produce 1.5×10^{22} antimony atom/m^3.the electron and hole mobility are $0.38 m^2$/V-s and $0.18 m^2$/V-s respectively, and the intrinsic charge density is $2.5 \times 10^{19}/m^3$. Calculate (8M)
   (i) the density of electrons and holes in crystal, and (ii) the conductivity.

3. a) Explain about Zener break down in detail (8M)
   b) Design a zener regulator for the following specifications: output voltage ,V_0=5V, load current,I_L =20mA,input voltage , $V_i = 12V \pm 3V$, zener wattage ,P_z=500mW (8M)

4. a) A full-wave rectified voltage of 18V peak is applied across a 500μF filter capacitor. Calculate the ripple and d.c voltages if the load takes a current of 100mA (8M)
   b) Determine the ripple factor of an L-type choke input filter comparing a 10H choke and 8μF capacitor used with an full-wave rectifier. Compare with a simple 8μF capacitor input filter at a load current of 50mA and also at 150mA. Assume the d.c voltage of 50V (8M)

5. a) Determine the h-parameters from the characteristics of CE configuration (8M)
   b) An NPN transistor if β=50 is used in common emitter circuit with V_{cc} =10V and R_c=2kΩ. the bias is obtained by connecting 100kΩ resistor from collector to base. Find the quiescent point and stability factor (8M)

6. a) Explain principle of operation and characteristics of power MOSFET (8M)
   b) Explain about JFET Characteristics (8M)

7. a) Draw the circuit diagram of Crystal oscillator .drive of expression for frequency of oscillations (8M)
   b) Find the efficiency of class A and class B of power amplifiers (8M)

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Code No RT21033 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
THERMODYNAMICS
(Com. to ME, AE, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Discuss about PMM I and PMM II
   b) Explain about Quasi static process.
   c) Show that the COP of a heat pump is greater than the COP of a refrigerator by unity.
   d) What is steam quality? What are the different methods of measuring the quality?
   e) Explain Mole fraction, Volume fraction.
   f) Explain Lenoir Cycle.

PART -B

2. a) Explain about thermodynamic system and control volume.
   b) A gas in a piston cylinder assembly undergoes an expansion process for which the relationship between pressure and volume is given by PV^n= const. The initial pressure is 0.3 MPa, the initial volume is 0.1 m^3 and the final volume is 0.2 m^3. Determine the work for the process in kJ if i) n = 1.5, ii) n=1.0 and iii) n=0.

3. a) What is first law of thermodynamics? Write the corollaries of first law of thermodynamics.
   b) In a turbo machine handling an incompressible fluid with a density of 1000 kg/m^3 the conditions of the fluid at the rotor entry and exit are as given below. The inlet conditions are pressure= 1.15 MPa, Velocity = 30 m/s, Height above datum = 10 m and the exit conditions are pressure = 0.05 MPa, Velocity= 15.5 m/s, Height above datum= 2 m. If the volume flow rate of the fluid is 40 m^3/s. Estimate the net energy transfer from the fluid as work.

4. a) Discuss about Clausius Inequality.
   b) One kg of ice at -5^{0}C is exposed to the atmosphere which is at 20-C. Ice melts and comes into thermal equilibrium with the atmosphere. Determine the entropy increase of the universe.

5. a) A rigid closed tank of volume 3m^3 contains 5 kg of wet steam at a pressure of 200 kPa. The tank is heated until the steam becomes dry and saturated. Determine the final pressure and the heat transfer to the tank.
   b) Discuss about degree of super heat and degree of sub cooling.

6. a) Derive the expression for change of enthalpy of an ideal gas in a reversible adiabatic process in terms of pressure ratio.
   b) Two streams of air 25^{0}C, 50% RH and 25^{0}C, 60% RH are mixed adiabatically to obtain 0.3 kg/s of dry air at 30^{0}C. Calculate the amount of air drawn from both the streams and the humidity ratio of mixed air.

7. a) Explain the working of Bell- Coleman cycle.
   b) Explain the working of Atkinson Cycle.

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Code No RT21033 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
THERMODYNAMICS
(Com. to ME, AE, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What are the different types of systems available? Explain.
   b) What will be the velocity of steam leaving a nozzle, if the velocity of approach is very small?
   c) Explain about heat engine and heat pump.
   d) Draw the phase equilibrium diagram for a pure substance on T-s plot with relevant constant pressure lines.
   e) Discuss about Carrier's Equation.
   f) Explain sterling cycle.

PART -B

2. a) Explain the concept of ideal gas temperature scale.
   b) A milk chilling unit can remove heat from the milk at a rate of 41.87 MJ/H. Heat leaking into milk from surroundings at an average rate of 4.187 MJ/h. Find the time required for cooling a batch of 500 kg of milk from 45^0C to 5^0C. Take the C_P of milk to be 4.187 kJ/kg K.

3. a) Derive the steady flow energy equation for an open system.
   b) Air flows steadily at the rate of 0.04 Kg/s through an air compressor, entering at 6m/s with a pressure of 1 bar and specific volume of 0.85 m^3 /Kg and leaving at 4.5 m/s with a pressure of 6.9 bar and a specific volume of 0.16 m^3 /Kg. The internal energy of the air leaving is 88 KJ/Kg greater than that of the entering air. Cooling water surrounding the cylinder absorbs heat from the air at the rate of 59 W. Calculate the power required to drive the compressor and the inlet and outlet cross sectional areas
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4. a) State and prove Clausius theorem.
   b) A reversible heat engine operates between two reservoirs at temperatures of 600^0C and 40^0C. The engine drives a reversible refrigerator which operators between reservoirs at temperatures 40^0C and -20^0C. The heat transfer to the heat engine is 2000kJ and the net work output of the combined engine refrigerator plant is 360 kJ. Evaluate the heat transfer to the refrigerator and the net heat transfer to the reservoir at 40^0C.

5. a) Steam at 0.8 MPa, 250^0C and flowing at a rate of 1 kg/s passes into a pipe carrying wet steam at 0.8 MPa, 0.9 dry. After adiabatic mixing the flow rate is 2.3 kg/s. Determine the condition of steam after mixing. The mixture is now extended in a frictionless nozzle isentropically to a pressure of 0.4 MPa. Determine the velocity of steam leaving the nozzle. Neglect the velocity of steam in the pipe.
   b) Discuss about dryness fraction of steam.

6. a) Derive the expression for change of internal energy of an ideal gas in a reversible adiabatic process in terms of pressure ratio.
   b) 1 kg of air at 20^0C, 40% RH is mixed adiabatically with 2 kg of air at 40^0C, 40% RH (on dry basis). Find the final condition of air.

7. With a neat sketch explain the working of Diesel cycle and derive the expression for its thermal efficiency

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Code No RT21033 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
THERMODYNAMICS
(Com. to ME, AE, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Show that work is a path function and not a property.
   b) Discuss about Vander Waals equation of state.
   c) Discuss mechanical, thermal and chemical irreversibility with one example each.
   d) Find the saturation temperature, change in specific volume and entropy during evaporation, and the latent heat of vaporization of steam at 3 MPa
   e) Explain Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity
   f) Explain Lenoir Cycle.

PART –B

2. a) Why does free expansion has zero work transfer?
   b) A new scale N of temperature is divided in such a way that the freezing point of ice 100^0N and the boiling point is 400^0N. What is the temperature reading on this new scale when the temperature is 160^0C. At what temperature both the Celsius and the new temperature scale reading would be the same.

3. a) Derive the energy balance equation of a steam nozzle and heat exchanger.
   b) In a gas turbine installation air is heated inside the heat exchanger up to 750^0C from the ambient temperature of 27^0C. Hot air then enters into the gas turbine with a velocity of 50 m/s and leaves at 600^0C. Air leaving the turbine enters a nozzle at 60m/s velocity and leaves the nozzle at the temperature of 500^0C. for unit mass of the flow rate of air, Examine the following assuming the adiabatic expansion in the turbine and nozzle. (i) Heat transfer to air in heat exchanger (ii) Power output from turbine (iii) Velocity at the exit of the nozzle. Take Cp of air as 1.005kJ/Kg K

4. a) Derive the expression for maximum work obtained from two finite bodies at temperature T_1 and T_2.
   b) Discuss about Maxwells equations.

5. a) Steam initially at 0.3 MPa, 250^0C is cooled at constant volume.
   i) At what temperature will steam become superheated vapour?
   ii) What is the quality of steam at 80^0C?
   iii) What is the heat transferred per kg of steam in cooling from 250^0C to 80^0C
   b) Discuss about triple point, critical temperature and critical pressure.

6. a) A reversible adiabatic process begins at P1= 10 bar, T1 = 300^0C and ends with P2= 2 bar. Find the specific volume and the work done per kg of fluid if
   (i) the fluid is air, and (ii) the fluid is steam.
   b) Discuss about sensible heating, cooling and dehumidification processes.

7. With a neat sketch explain the working of Brayton cycle and derive the expression for its thermal efficiency

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Code No RT21033 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
THERMODYNAMICS
(Com. to ME, AE, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What do you understand by path and point functions.
   b) What is First law of Thermodynamics? Write its Corollaries.
   c) What is a heat pump? How does it differ from a refrigerator?
   d) Find the saturation temperature, change in specific volume and entropy during evaporation, and the latent heat of vaporization of steam at 2 MPa
   e) Explain Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature
   f) Explain Erricsson cycle.

PART -B

2. a) Explain the working of constant volume gas thermometer.
   b) 2kg of gas at a pressure of 1.5 bar, Occupies a volume of 2.5 m^3. If this gas compresses isothermally to 1/3 times the initial volume. Find initial. Final temperature, work done, heat transfer.

3. a) With a neat sketch explain Joule's experiment.
   b) A turbine operates under steady flow conditions, receiving steam at the following state: Pressure 1.2MPa, temperature 188^0C , enthalpy 2785 KJ/Kg, velocity 33.3m/s and elevation 3m. The steam leaves the turbine at the following state: Pressure 20 MPa, enthalpy 2512 KJ/Kg, velocity 100m/s and elevation 1 m. Heat is lost to the surroundings at the rate of 0.29 KJ/s. If the rate of steam flow through the turbine is 0.42 Kg/s, What is the power output of the turbine?

4. a) Determine the maximum work obtained by using one finite body at temperature T and a thermal energy reservoir at temperature T_0, $T > T_0$.
   b) Discuss about reversibility and irreversibility.

5. a) Explain the working of throttling calorimeter.
   b) Steam initially at 1.5 MPa, 300^0C expands reversibly and adiabatically in a steam turbine to 40^0C. Determine the ideal work output of the turbine per kg of steam.

6. a) A fluid at 200 kPa and 300^0C has a volume of 0.8 m^3. In a friction less process at constant volume the pressure changes to 100 kPa. Find the final temperature and heat transferred (i) if fluid is air, and (ii) if the fluid is steam.
   b) Explain the following processes
   i) Cooling and dehumidification, ii) Heating and humidification.

7. With a neat sketch explain the working of simple Rankine cycle and derive the expression for its thermal efficiency. Discuss the methods to improve the thermal efficiency.

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Code No: RT21041 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRONIC DEVICES AND CIRCUITS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Draw the energy band structures of Insulators, Semi conductors and Metals (3M)
   b) Draw the Construction diagram and characteristics of the SCR (4M)
   c) Derive expression for the efficiency of a Half wave rectifier circuit (4M)
   d) Transistor works as an amplifier, justify? (4M)
   e) Draw the BJT collector to base bias circuit and derive for the stability factor 'S' (4M)
   f) Draw the small signal low frequency h-parameter model of a CE Transistor (3M)

PART -B

2. a) Derive expression for current density of an intrinsic semiconductor (8M)
   b) Show that the Fermi energy level lies in the centre of forbidden energy band for an intrinsic semiconductor? Derive. (8M)

3. a) Determine the forward resistance of a Silicon PN junction diode when the forward current is 6 m A at room temperature (8M)
   b) Draw the energy band structure of an open circuited PN junction and derive expression for the total shift in the energy level E_0 (8M)

4. a) Draw the Half-wave rectifier with relevant waveforms and derive expression for its efficiency (10M)
   b) Design LC filter for a Full-wave rectifier circuit to provide an output voltage of 10 V with a load current of 200 m A and the ripple is limited to 2%. (6M)

5. a) Draw the construction diagram, operation characteristics and parameters of JFET (8M)
   b) For the NPN transistor connected in CE configuration with V_{CC}=9 V, V_{BB}=4V, I_C = 5 m A, V_{CE}=5 V, β=50 and V_{BE}=0.7 V. Find β and R_B (8M)

6. a) Discuss the need for biasing a transistor and illustrate the DC load line analysis of BJT (8M)
   b) A p-n-p Germanium transistor is used in CE mode with self bias circuit. The circuit component values are V_{CC} = 4.5 V, R_C = 1.5 kΩ, R_e = 0.27 kΩ, R_1= 2.7 kΩ, R_2 = 27 kΩ. If β = 44, find the quiescent point. (8M)

7. a) Give the complete analysis of CE transistor amplifier circuit using h-parameters and derive expressions for the current gain, voltage gain, input impedance and output admittance (8M)
   b) Give the complete low-frequency analysis of Common Source FET amplifier (8M)

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Code No: RT21041 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRONIC DEVICES AND CIRCUITS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Compare and contrast drift and diffusion mechanisms (4M)
   b) Draw the energy band diagram of an open circuited PN junction (3M)
   c) Draw the Bridge rectifier circuit with input and output waveforms (4M)
   d) If the transistor has an α of 0.98, find the value of β and if β is 200 find α (4M)
   e) Draw the self bias circuit for BJT and derive for the stability factor 'S' (4M)
   f) Draw the small signal low frequency h-parameter model of a CB Transistor (3M)

PART -B

2. a) Elaborate how Hall effect is used to measure mobility and conductivity? Derive relevant expressions (8M)
   b) Calculate the resistivity of an intrinsic germanium at 300^0 K. Given, $n_i = 2.5x10^{13}$ per cm^3, $\mu_n = 3800\ cm^2/V\text{-}Sec.$ and $\mu_p = 1800\ cm^2/V\text{-}Sec.$. (8M)

3. a) Draw the Construction diagram, operation and characteristics of SCR (8M)
   b) Derive expression for the Transition capacitance of PN junction diode (8M)

4. a) Draw the Full-wave rectifier with center tapped transformer, draw relevant waveforms and derive expression for its efficiency. (8M)
   b) A Full-wave rectifier is connected with LC filter, derive expression for the ripple factor and draw relevant waveforms (8M)

5. a) Draw the drain characteristics of depletion mode MOSFET. Explain different operating regions. (8M)
   b) For the NPN transistor connected in CE mode with $V_{CC}=12V$, $V_{BB}=5V$, $I_C=15$ m A, $V_{CE}=5$ V, $\beta=99$, $V_{BE}=0.7$ V and $R_E=55\Omega$ Find I_B,R_B and R_C (8M)

6. a) What is the need to fix the operating point of a transistor and illustrate the complete AC load line analysis of BJT (8M)
   b) A p-n-p transistor is used in a common collector circuit with $R_C=0$. The circuit component values are $V_{CC}=3$ V, $R_e = 1k\Omega$, $R_1=R_2= 5k\Omega$. If $\beta = 44$, find the quiescent point. (8M)

7. a) Give the complete analysis of CC transistor amplifier circuit using h-parameters and derive expressions for the current gain, voltage gain, input impedance and output admittance (10M)
   b) Find the value of h_{oe} in terms of CB h-parameters (6M)

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Code No: RT21041 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRONIC DEVICES AND CIRCUITS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) State Hall effect and what are its applications (4M)
   b) The reverse saturation current of a Silicon PN junction diode is 10 µA. calculate the diode current for the forward bias voltage of 0.5V at 27^0C. (4M)
   c) Draw the Full wave rectifier circuit with input and output waveforms (3M)
   d) Draw the Ebers-Moll model of a transistor (3M)
   e) What is thermal runaway? Brief it (4M)
   f) Compare different transistor amplifiers (4M)

PART -B

2. a) A specimen of silicon has a square cross section of 3x3 mm and length of 3.5 cm, the current is due to electrons with mobility of 1300 cm^2/V-Sec. A DC voltage of 1V is impressed across the bar results 8 m amp of current. Calculate the concentration of free electrons and the drift velocity. (8M)
   b) State and explain Hall effect and derive for Hall voltage? What are the applications of Hall effect? (8M)

3. a) Compare and contrast Zener breakdown and Avalanche breakdown (8M)
   b) Draw the Construction diagram, operation and characteristics of UJT (8M)

4. a) Draw the Bridge rectifier with relevant input and output waveforms and derive expression for its efficiency (8M)
   b) A Full-wave rectifier is connected with an inexpensive capacitor filter, derive expression for the ripple factor and draw relevant waveforms (8M)

5. a) Compare and contrast JFET with MOSFET? Draw the symbols of all MOSFETs (8M)
   b) The NPN transistor has α=0.98, I_{CO}=1.6µA. This transistor is used in CE configuration with V_{CC}=12V and R_L=6KΩ. Calculate the minimum base current required for the transistor to enter into saturation (8M)

6. a) Draw the self bias circuit with BJT and derive expressions for all the three stability factors (8M)
   b) Assume a Silicon transistor with self bias arrangement. Given that β=50, $V_{BE\ active}$ =0.7, V_{CC} = 22.5 V, and R_C = 5.6 k Ω. It is desired to establish the Q-point at V_{CE} = 12 V, I_C = 1.5 m A, and stability factor S ≤ 3. Find R_E, R_1 and R_2 (8M)

7. a) The CE transistor amplifier circuit has the following specifications: h_{ie} = 1100Ω, h_{re} = 2.5 x 10^{-4}, h_{fe} = 50, h_{oe} = 24 µA/V. If R_L = 10 k Ω and R_S = 1 k Ω , Find various gains and input, output impedances (10M)
   b) Find the value of h_{re} in terms of CB h-parameters (6M)

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Code No: RT21041 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRONIC DEVICES AND CIRCUITS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Relate conductivity with current density in a semiconductor (4M)
   b) Draw the Construction diagram and characteristics of the Photo diode (4M)
   c) Compare various filter circuits in terms of ripple factors used with rectifier circuits (4M)
   d) Compare JFET and MOSFET (4M)
   e) A FET has a drain current of 4 mA, if I_{DSS} is 10 mA and V_P is - 6V. Find the value of Gate to Source voltage (3M)
   f) Draw the small signal model of FET (3M)

PART -B

2. a) In a P-type semiconductor, the Fermi level is 0.35 e V above the valance band at room temperature. Determine the new position of the Fermi level for temperatures of 350^0K and 400^0K (8M)
   b) Derive expression for the continuity equation (8M)

3. a) What is a Tunnel diode? Explain the construction and working with neat band diagrams? Draw its characteristics (8M)
   b) Calculate the dc and dynamic ac resistances of a Silicon diode at 300^0K with I_0=2.5 μA and at an applied voltage of 0.25 V across the diode (8M)

4. a) Define transformer utilization factor and derive its expression for i) Half wave rectifier ii) Full wave rectifier. (8M)
   b) A Full-wave rectifier is connected with an inductor filter, derive expression for the ripple factor and draw relevant waveforms (8M)

5. a) From the transistor current components, deduce the current equation of transistor (8M)
   b) Calculate the values of I_D and g_m for V_{GS} = -0.8V, if I_{DSS} and V_P are given as 12.(4M)A and -6V respectively. (8M)

6. a) The CE transistor uses a Collector to Base bias circuit has V_{CC}=12V, R_C=2 kΩ and R_B = 100 kΩ. Calculate quiescent point and stability factor 'S' (8M)
   b) What is thermal runaway? Derive relevant expressions to obtain thermal stability (8M)

7. a) From the low-frequency small signal FET model, derive for the FET parameters (8M)
   b) The CC transistor amplifier circuit has the following specifications: (8M)
   h_{ic} = 1100Ω, h_{rc} = 0.99, h_{fc} = -51, h_{oc} = 25 μA/V. If R_L = 15 k Ω and R_S = 1 k Ω , Find various gains and input, output impedances

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Code No: RT21051 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
OBJECT ORIENTED PROGRAMMING THROUGH C + +
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

PART –A

1.	a)	What are the disadvantages of Conventional Programming?	(4M)
	b)	Discuss about scope Access Operator with example.	(4M)
	c)	Discuss about Volatile Member Function.	(3M)
	d)	Define constructor and give example	(4M)
	e)	Define pure Virtual function.	(4M)
	f)	What are sequential access files?	(3M)

PART –B

2.	a)	Explain about the Formatted and Unformatted Console I/O Operations.	(8M)
	b)	Discuss about the Bit Fields.	(8M)
3.	a)	What is function overloading? Explain.	(8M)
	b)	Write a recursive program for finding the GCD between two numbers.	(8M)
4.	a)	Discuss about Member functions and Non-Member functions.	(8M)
	b)	Write a program for finding the roots of given expression.	(8M)
5.	a)	Define parameterized constructors? What are the applications of constructors?	(8M)
	b)	How dynamic initialization is done using constructors? Explain.	(8M)
6.	a)	Write short notes on access specifiers.	(8M)
	b)	Explain about the multiple inheritance with example.	(8M)
7.	a)	What is Template? What is the need of Template? Declare a Template class.	(8M)
	b)	Discuss about the importance of try, catch and throw keywords.	(8M)

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Code No: RT21051 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
OBJECT ORIENTED PROGRAMMING THROUGH C + +
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

PART –A

1.	a)	Write the importance of Header files.	(4M)
	b)	What is function? Write the structure of function.	(4M)
	c)	Define Scope and Encapsulation.	(3M)
	d)	Explain about destructor with example.	(4M)
	e)	Define Virtual Base Class.	(4M)
	f)	What are the principles of Exception Handling?	(3M)

PART –B

2.	a)	Write the structure of C++ Program? Give example.	(8M)
	b)	Discuss about the member function of Istream class.	(8M)
3.	a)	How to pass arguments to functions? Give examples.	(8M)
	b)	Write a program for swapping two numbers using functions.	(8M)
4.	a)	Write a program for finding whether the given no is Armstrong or not.	(8M)
	b)	Explain about overloading member functions.	(8M)
5.	a)	What is constructor overloading? Give examples.	(8M)
	b)	What are recursive constructors? Explain.	(8M)
6.	a)	What is Binding? Differentiate between static and Dynamic Binding.	(8M)
	b)	What is Virtual function? What are the rules for Virtual functions?	(8M)
7.	a)	Write a recursive Template function for the factorial program.	(8M)
	b)	Explain how Exceptions are catched in C++.	(8M)

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Code No: RT21051 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
OBJECT ORIENTED PROGRAMMING THROUGH C + +
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

PART –A

1.	a)	What are the advantages of OOP?	(4M)
	b)	Discuss about the Memory management Operators.	(4M)
	c)	Explain about Nested classes.	(3M)
	d)	Define copy constructor?	(4M)
	e)	What is Abstract class? Explain.	(4M)
	f)	Explain about file stream classes.	(3M)

PART –B

2.	a)	Differentiate between C and C++.	(8M)
	b)	What is stream and stream classes? How streams are represented in C++?	(8M)
3.	a)	What is function overloading? What are the principles of function overloading?	(8M)
	b)	Write a program for adding two numbers using function overloading.	(8M)
4.	a)	Discuss about Overloading member functions.	(8M)
	b)	What is the importance of static keyword? Give examples.	(8M)
5.	a)	What are the characteristics of constructors and destructors?	(8M)
	b)	How constructors are used for declaring the static members? Explain.	(8M)
6.	a)	What are the advantages and disadvantages of inheritance?	(8M)
	b)	Discuss about Hybrid inheritance with an example.	(8M)
7.	a)	What is Exception? How to catch multiple exceptions.	(8M)
	b)	How to overload Template functions? Explain.	(8M)

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Code No: RT21051 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
OBJECT ORIENTED PROGRAMMING THROUGH C + +
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

PART –A

1.	a)	Discuss about Formatted and Unformatted data	(4M)
	b)	What is Lvalues and Rvalues? Discuss.	(4M)
	c)	Define friend function.	(3M)
	d)	Define Anonymous object.	(4M)
	e)	Write short notes on Reusability.	(4M)
	f)	What are different file openings Modes? Discuss.	(3M)

PART –B

2.	a)	What is OOP? Discuss about the OOPs concepts.	(8M)
	b)	Explain about user defined manipulators.	(8M)
3.	a)	Define inline function? Write a program for finding the area of a triangle using inline functions.	(8M)
	b)	Write program to find whether the given number is strong number or not.	(8M)
4.	a)	Differentiate between class and Object.	(8M)
	b)	Write a program for calculating the total marks and Grade of the 60 students in a class.	(8M)
5.	a)	How to pass default arguments for Constructors? Give examples.	(8M)
	b)	What are the rules for declaring the constructor? Give examples for constructors.	(8M)
6.		What is inheritance? What are different types of inheritance? Explain with example.	(16M)
7.	a)	Write a program for catching array out of bounds exception.	(8M)
	b)	What are different types of containers? Explain.	(8M)

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Code No: R21013 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
ELECTRICAL AND ELECTRONICS ENGINEERING
(Com. to CE, ME, CHEM, PE, AME, MM)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain briefly about the Resistor, Inductor and Capacitor. (8M)
   b) What do you understand by star – delta and delta to star transformation and give its significance? (7M)

2. a) Explain with a neat sketch the constructional features of a dc machine. (8M)
   b) Derive an expression for the torque of a dc motor. (7M)

3. a) Explain the working principle of a single phase transformer. (8M)
   b) The no - load ratio required in a single phase 50 Hz transformer is 8000/800V. If the maximum value of flux in the core is to be about 0.066 Wb , find the number of turns in each winding (7M)

4. a) Differentiate between the Squirrel cage and wound cage type of rotors in Induction motors. (7M)
   b) Explain how a rotating magnetic field can be produced in an Induction motor. (8M)

5. a) Explain the operation of half wave rectifiers with a neat diagram and output waveforms. (8M)
   b) List the different applications of the Diode. (7M)

6. a) Explain the Input and output characteristics of Common Collector configuration for a Bipolar Junction Transistor (8M)
   b) Explain the frequency response of a Common Emitter Amplifier (7M)

7. a) List the advantages of Induction heating over other heating methods (8M)
   b) List the applications of Dielectric heating (7M)

8. Write Short notes on the Following: (15M)
   a) Thermostats
   b) Applications of CRO
   c) Applications of Strain Gauges

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Code No: R21023 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
ELECTRICAL CIRCUIT ANALYSIS - I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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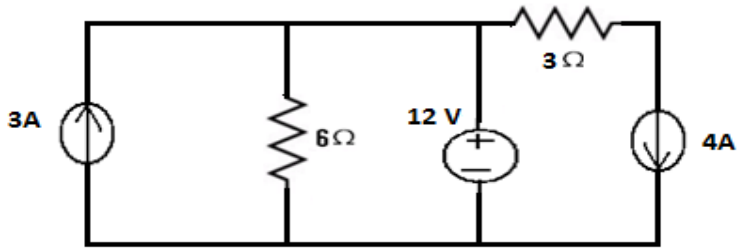
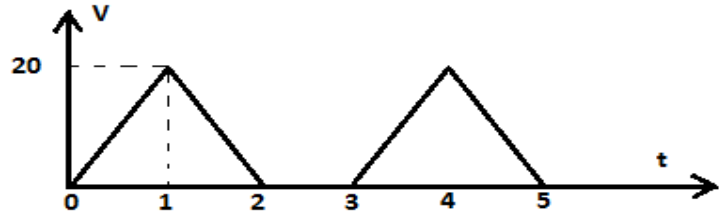
1. a) A series connection of two resistors of resistances 100Ω and 60Ω is connected to a battery of EMF 50V and internal resistance 1Ω. Determine the voltage across 60Ω resistor. Recalculate the voltage across 60Ω resistor when the internal resistance is neglected and also find the percentage change in the voltage. (8M)
   b) Explain different types of dependent sources in detail (7M)

2. a) Derive the relationship for the conversion of star connected resistors into delta connected resistors and vice – versa. (7M)
   b) In the circuit shown below, find the powers involved in each of the five elements and whether absorbed or generated (8M)



3. a) Calculate current, real power, reactive power, apparent power and power factor (lagging/leading) for the circuit having impedances (5+j10) Ω and (6-j15) Ω connected in parallel fed from an AC supply of 200V (7M)
   b) Determine RMS and Average values of the waveform below (8M)



4. a) Draw the locus diagram of parallel RLC circuit and explain in detail (8M)
   b) A coil with R = 12 ohm and L = 0.3H is in series with a capacitor of 15 mF. Calculate the i) the resonant frequency ii) Q factor and iii) band width (7M)
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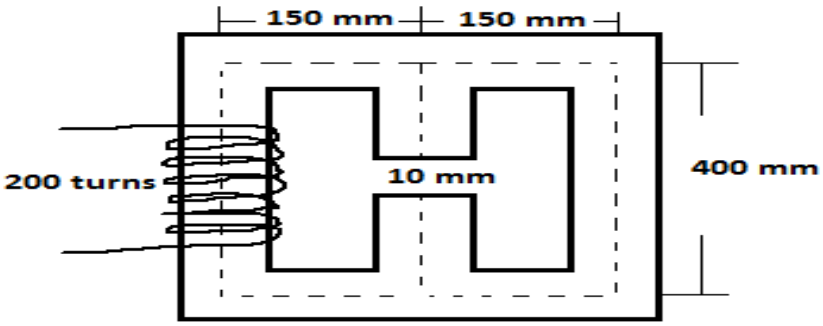
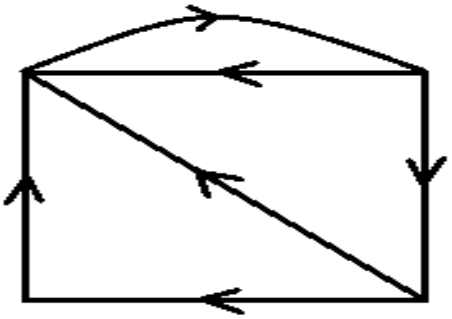
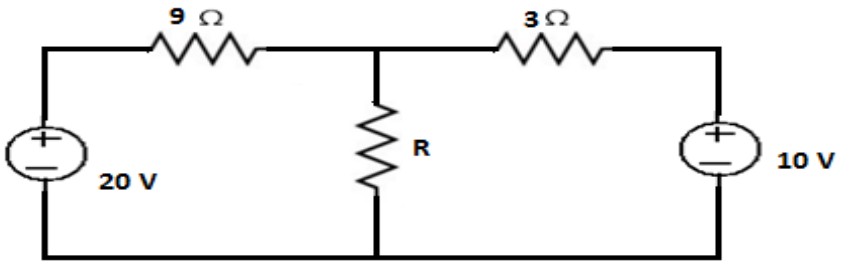
5. a) Explain in detail about the dot convention with an example (8M)
   b) In the magnetic circuit below, calculate the current to be passed in the coil having 200 turns in order to establish a flux of 1.2 mWb in the air gap. Neglect fringing effect and leakage flux. Cross sectional area of the core is 10^{-3} m^2. Relative permeability of the core is 5000 (7M)



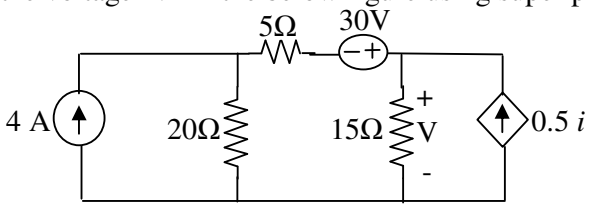
6. a) With the help of examples, define graph, sub graph, path and degree of vertex (8M)
   b) For the graph below, find out the tieset matrix by taking necessary assumptions (7M)



7. a) State and explain the Thevenin's theorem for the circuits with sinusoidal excitation (8M)
   b) Using maximum power transfer theorem, determine the maximum power that is delivered to the unknown resistor R in the circuit below (7M)



8. a) State and explain the Tellegen's theorem for the circuits with sinusoidal excitation (8M)
   b) Calculate the voltage 'V' in the below figure using super position principle (7M)



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Code No: R21042 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
NETWORK ANALYSIS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) State and explain Kirchhoff's laws with an example.
   b) A resistance of 20 Ω is connected in series with a condition of two resistances arranged in parallel each of value 40 Ω. Determine the resistance R_3 which should be shunted across the parallel combination so that the total currents drown by the circuit is 1.5A with applied voltage of 40 V.

2. a) For the Figure 1, shown draw five different trees.
   b) Determine R.M.S and Average value of the waveform shown in Figure 2.

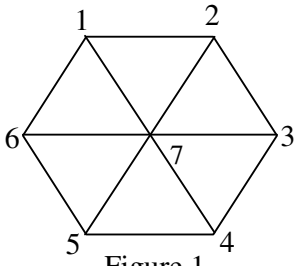

Figure 1

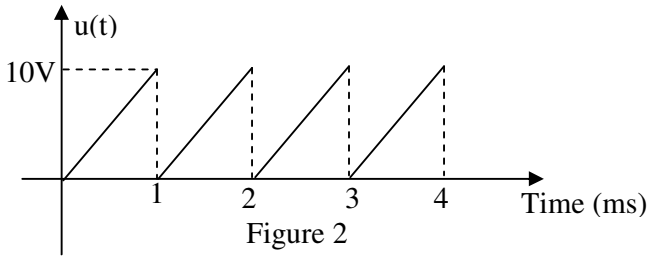

Figure 2

3. a) A coil having a resistance of 7Ω and an inductance of 31.8 mH is connected to 230V, 50Hz supply. Calculate (i) the circuit current (ii) phase angle
   (iii) power factor (iv) power consumed and draw the phasor diagram.
   b) Show that power consumed by a pure inductance is zero.
   c) Calculate the impedance of a series combination comprised of a 1 mF, 2 mF and 3 mF capacitor if operated at a frequency of (i) 1 Hz (ii) 100 Hz.

4. a) Explain the dot convention in mutually coupled coils.
   b) Calculate half-power frequencies, resonant frequency, bandwidth and Q-factor for series RLC circuit with R=0.2 ohms, L=0.1 H and C=50 μF.
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5. a) State and explain the Tellegen's theorem.

   b) Find the Thevenin's equivalent circuit with respect to terminals a-b in Figure 3.

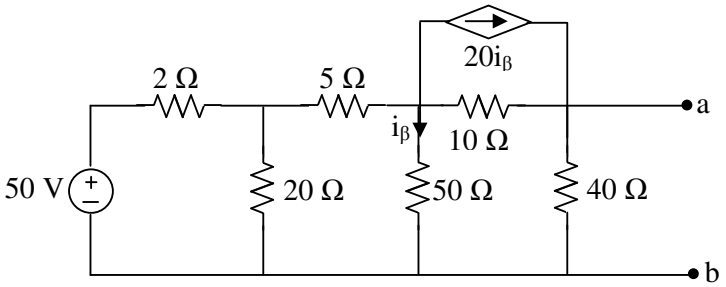

Figure 3

6. a) Obtain the inter relationship between ABCD parameters and Z-parameters.

   b) Determine the h-parameters of the circuit in Figure 4.

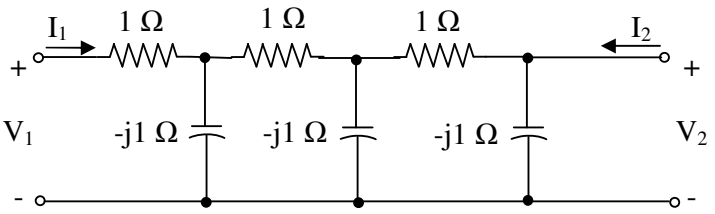

Figure 4

7. a) Explain the procedure to evaluate initial conditions in R-L, R-C and R-L-C transient circuits.

   b) A 0.2 H inductor is in parallel with a 100 Ω resistor. The inductor current is 4A at t = 0.

   (i) find $I_L(t)$ at t = 0.8 ms.

   (ii) If another 80 Ω resistor is connected in parallel with the inductor at t = 1ms, calculate I_L at t = 2 ms.

8. a) Explain the properties of band elimination filter. Discuss its merits over other filters.

   b) Design a prototype band stop filter section having cut-off frequencies of 2000 Hz and 5000 Hz and design resistance of 600Ω.

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Code No: R21052

R10

SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
PROBABILITY AND STATISTICS
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) A, B, C in order toss a coin. The first one who tosses a head wins the game. What are the probabilities of winning, assuming that the game may continue indefinitely? (8M)
   b) State and prove Baye's theorem. (7M)

2. a) If X is uniformly distributed in $-2 \le x \le 2$. Find i) P(X<1) ii) P(|X-1 |≥1/2) (8M)
   b) If X is a continuous random variable with probability density function given by (7M)

$$f(x) = \begin{cases} kx^{\alpha-1}(1-x)^{1-\beta} \; for \; 0 < x < 1, \;\; \alpha > 0, \beta > 0 \\ 0 \qquad\qquad\qquad otherwise \end{cases}$$

   Find k and mean value of X.

3. a) The probability of a man hitting a target is 1/3. i)if he fires 5 times what is the probability of his hitting the target at least twice. ii) How many times must he fires so that the probability of his hitting the target at least once is more than 90%? (8M)
   b) A manufacturer of pins knows that 2% of his product is defective. If he sells pins in boxes of 100 and guarantees that not more than 4 pins will be defective. What is the probability that a box will fail to meet the guaranteed quality. (7M)

4. a) Suppose the diameter of motor shafts in a lot have a mean of 0.249 inches and standard deviation of 0.003 inches. The inner dia of bearings in another lot have a mean of 0.255 inches and standard deviation of 0.002 inches. If a shaft and bearing are selected at random, find the probability that the shaft will not fit inside the bearing. Assume that both dimensions are normally distributed. (8M)
   b) If the mean of breaking strength of copper wire is 575 lbs with a standard deviation of 8.3 lbs. 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 572 lbs. (7M)
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5. a) Discuss the test of significance procedure. (7M)

   b) It is observed that 174 out of a random sample of 200 truck drivers on highway during night are drunk. Is it valid to state that atleast 90% of the truck drivers are drunk? Use 0.05 LOS. (8M)

6. a) The average weekly losses of man hours due to strikes in an institute before and after a disciplinary program was implemented are as follows (8M)

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

   Is there reason to believe that the disciplinary program is effective at 0.05 LOS.

   b) Write the properties of t-distribution. (7M)

7. a) What are the major parts of a Control Chart. (7M)

   b) Calculate coefficient of correlation from the following data (8M)

X	12	9	8	10	11	13	7
Y	14	8	6	9	11	12	3

8. a) Discuss about classification of queuing models (8M)

   b) Workers come to a tool store room to enquire about the special tools for a particular job. The average time between the arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time is 40 seconds. Find i) average queue length ii) Average length of non-empty queue. (7M)

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Code No: X0425 **R07** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
ELECTRONIC CIRCUIT ANALYSIS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 80

Answer any FIVE Questions
All Questions carry **Equal** Marks
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1. a) Draw the circuit of common collector amplifier and give its h-parameter model. (8M)
   b) Draw the h-parameter model of CE configuration amplifier and derive expression for input and output impedance, with and without Rs (8M)

2. a) What is the effect of coupling and bypass capacitor on the frequency response of RC coupled amplifier. (8M)
   b) Derive the expression for Ai, Ri, Av and Ro of bootstrapped Darlington circuit. (8M)

3. a) Derive the expression for F_T and F_β of CE amplifier using HF model. (8M)
   b) The low frequency parameters of a transistor at Ic = 20 mA, V_{CE} = 10 V and at room temperature hie = 400Ω, hoe = 10^{-5} A/V, hfe = 150, hre = $10^{-4.}$ At the same operating point F_T = 60 MHz and Cob = 3 pF, compute the values of all hybrid-∏ parameters. (8M)

4. a) Explain the working of complementary symmetry class B amplifier using neat sketch of circuit diagram. What are its advantages? (8M)
   b) Derive the condition for maximum power dissipation for a class B amplifier. (8M)

5. a) Define Q factor in tuned amplifiers. Explain in detail about unloaded Q and loaded Q. (8M)
   b) What are the various types of tuned amplifiers? Explain each one briefly. (8M)

6. a) In a class C tuned amplifier, R_L = 6 KΩ and required tank circuit Q is 75. Calculate the values of L and C of the tank circuit where Vcc = 15V, resonant frequency is 5 MHz and worst case power dissipation = 20 mW. (8M)
   b) Draw the circuit diagram of class C tuned amplifier and explain its operation and frequency response. (8M)

7. a) Compare series regulator and shunt regulator circuits. (8M)
   b) Draw the circuit diagram of a simple current limiting circuit and explain it operation under over current condition. (8M)

8. a) Explain in detail the advantages of switched mode power supplies over linear regulators. (6M)
   b) Draw the block diagram of a SMPS and explain its operation. (10M)

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Code No: X0524/R07 **Set No. 1**

II B.Tech I Semester Supplementary Examinations, Oct/Nov. 2016
DIGITAL LOGIC DESIGN
(Common to Computer Science & Engineering, Information Technology and Computer Science & Systems Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Convert the following to Decimal and then to Octal.
   (a) $2A7_{16}$
   (b) $1BB_{16}$
   (c) 10110111_2
   (d) 11011010_2 [4x4]

2. (a) Explain in detail, the various levels of integration in ICs.
   (b) Obtain the Dual of the following Boolean expressions.
      i. AB + A(B + C) + B'(B + D)
      ii. A + B + A'B'C.
   (c) Obtain the complement of the following Boolean expressions. [8+4+4]
      i. A'B + A'BC' + A'BCD + A'BC'D'E
      ii. ABEF + ABE'F' + A'B'EF.

3. (a) Implement the following Boolean function F using the two level forms NAND-AND, AND-NOR.
   $F(w, x, y, z) = \Sigma 0, 1, 2, 3, 4, 8, 9, 12$
   (b) Draw NOR-logic diagram that implements the following function: [8+8]
   $f(A, B, C, D) = \Sigma 0, 1, 2, 3, 4, 8, 9, 12.$

4. (a) A Boolean function is defined by the following function:
   F_1(A,B,C,D) = Π (1,2,4,7,8,11,13,14)
   Implement this function using 4 × 1 multiplexer with inputs B, C as select lines S_1, S_0 of multiplexer and A, D inputs for data lines of multiplexer.
   (b) Design a code converter to convert 9's complement to excess-3 code (BCD code +3) using Full-adders and additional gates.
   (Use only block diagrams for Full-adders). [8+8]

5. (a) Explain characteristic tables and characteristic equations for D, J-K and T filp-flops.
   (b) Draw and explain circuit diagram for D-flip-flop asynchronous reset. [8+8]

6. (a) Design a 4-bit ring counter using T- flip flops and draw the circuit diagram and timing diagrams.

(b) Draw the block diagram and explain the operation of serial transfer between two shift registers and draw its timing diagram. [8+8]

7. (a) What is parity checking? Explain its necessity and how is it implemented?

(b) Given the 8 bit data word 01011011, generate the 13-bit composite word for the Hamming code that corrects single errors and detects double errors. [8+8]

8. (a) Explain static and dynamic hazards in asynchronous sequential logic with an example.

(b) The Boolean functions for the inputs of an SR latch are
S=$x_1'x_2'x_3 + x_1x_2x_3$ and R= $x_1x_2' + x_2x_3'$
Obtain the circuit diagram using a minimum number of NAND gates. [8+8]

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