Code: 9A05302

1

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

ADVANCED DATA STRUCTURES

(Common to ECC, CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) List down the advantages of OOP.
(b) Write a note on looping statements in C++.

2 (a) What is polymorphism? Explain and give an example for run-time polymorphism.
(b) Explain different types of inheritance.

3 (a) What is a stack? Write the operations that can be performed on a stack.
(b) Write a C++ program to check for balancing parenthesis using a stack.

4 (a) Explain about hashing collision resolution techniques.
(b) Compare linear list representation with skip list representation.

5 (a) Define ascending and descending heap. Trace heap sort algorithm for 20, 33, 12, 22, 11, 34, 56, 30, and 40.
(b) Explain any one external sorting method with example.

6 (a) What are AVL trees? Arrange the following list of integers in an AVL trees: 39,48,62,18,23,34,58.
(b) What are binary search trees? Arrange the above list of integers into a BST.

7 Compare m-way search tree with binary search tree. Give suitable example.

8 Discuss the following pattern matching algorithms with merits and demerits:
(a) Brute force algorithm.
(b) Knuth-Morris-Pratt algorithm.

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Code: 9A05302

2

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

ADVANCED DATA STRUCTURES

(Common to ECC, CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) What are constructors and destructors? Explain how they differ from normal functions? Illustrate with an example.

(b) How does structures in C and C++ differ? Explain with example.

2 (a) Write a C++ program to illustrate the use of overloaded constructors.

(b) Describe the various file stream classes.

3 Explain the following:

(a) Linked list with a header.

(b) Doubly linked list.

(c) Circularly linked list.

4 (a) What is the folding method of hashing? Explain.

(b) What is double hashing? Illustrate double hashing using a suitable example.

5 Explain heap structures. How are binary heaps implemented? Give its algorithm with example.

6 Write a C++ program to implement AVL tree and its operations.

7 Define B-tree. What are the applications of B-tree? Construct B-tree for the following sequence of keys: 25 5 8 17 20 12 15

8 Explain the construction of suffix trie with suitable example.

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Code: 9A05302

3

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

ADVANCED DATA STRUCTURES

(Common to ECC, CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Discuss in detail the various class access specifiers.
(b) Explain the use of pointers in C++ with example.

2 (a) When do you use a virtual function? Explain with suitable example.
(b) Write a program in C++ to count the number of words in a line of text.

3 (a) Write an algorithm for deleting a node after a given location from the singly linked list.
(b) What are structures? Give the use of structures.

4 (a) Explain the functionality of linear and quadratic probing with respect to hashing technique.
(b) The following values are to be stored in a hash table 25, 42, 96, 101, 102, 162, 197 and 201. Use division method of hashing with a table size of 11.Use sequential method of resolving collision. Give the contents of array.

5 (a) Write priority queue ADT.
(b) Using heap sort, sort the following data: 46, 78, 13, 27, 55, 98, 34, 65, 38 and 9.

6 What are the four cases that violate the AVL tree condition? Give examples showing height imbalance for each case.

7 (a) Explain about B-trees with example.
(b) Write a C++ program to implement Red-black tree operations.

8 Explain standard tries with suitable example. Also write a C++ program to implement standard tries.

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Code: 9A05302

4

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

ADVANCED DATA STRUCTURES

(Common to ECC, CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Define the terms constructor and destructor. Give an example of each. What is copy constructor? Give an example to illustrate its use.

(b) Explain the purpose of macros in C++ with the help of an example.

2 (a) Explain virtual base class.

(b) Explain the concept of generic programming.

3 (a) What do you mean by abstract data type? Explain with example.

(b) Write a C++ program to display the contents of a queue.

4 (a) Compare linear list representation with skip list representation.

(b) Write notes on rehashing and extendible hashing.

5 (a) Implement priority queue ADT.

(b) Explain insertion and deletion operations in a heap with example.

6 Describe the following with respect to a binary search tree (BST):

(a) Analyzing the BST search algorithm.

(b) Inserting nodes into a BST.

(c) The order of insertion determines the BST's topology.

(d) Deleting nodes from a BST.

7 How do you find the complexity involved in implementing red-black trees? Explain.

8 Explain compressed tries with suitable example. Also write a C++ program to implement compressed tries.

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Code: 9ABS304

1

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

PROBABILITY & STATISTICS

(Computer Science and Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 In a bolt factory machines A, B, C manufacture 20%, 30%, 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. What is the probabilities that is manufactured by machines A, B and C?

2 The frequency function of a continuous random variable is give $f(x)=Y_0\ x(2-x)\ 0\le x\le 2$. Find the value of Y_0, mean and variable of X.

3 (a) If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that (i) $26 \le x \ge 40$ *and* (ii) $x \ge 45$

(b) Find the probability that a random variable having the standard normal distribution will take on a value between .81 and 1.28.

4 (a) A normal population has a mean of .1 and a S.D of 2.1. Find the probability that the mean of simple sample of 900 members will be negative.

(b) A research worker wishes to estimate mean of a population by using sufficiently large sample. The probability is 95% that sample mean will not differ from the true mean by more than 25% of the standard deviation. How large a sample should be taken?

5 (a) It is desired to estimate the mean number of hours of continuous use until a certain computer will first require repairs. If it can be assumed that σ = 48 hours, how large a sample be needed so that one will be able to assert with 90 % confidence that the sample mean is off by at most 10 hours?

(b) What is the maximum error one can expect to make with probability 0.90 when using the mean of a random sample of size n = 64 to estimate the mean of the population with σ^2 = 2.56?

(c) A random sample of size 100 is taken from a population with σ = 5.1. Given that the sample mean is $\bar{x}$ = 21.6. Construct a 95% confidence interval for the population mean μ.

Contd. in Page 2

6 (a) A sample of 400 male students is found to have a mean height of 171.38 cm. Can it be reasonably regarded as a sample from a large population with mean of 171.17 cm. and S.D. of 3.30 cm?

(b) In a sample of 600 students of a certain college 400 are found to use dot pens. In another college from a sample of 900 students 450 were found to use dot pens. Test whether the two colleges are significantly different with respect to the habit of using dot pens.

7 From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees?

Soft drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thums up	15	30	65
Fanta	50	60	30

8 (a) Prove that the probability that there are n customers in the system = $\rho^n (1-\rho)$.

(b) A TV repair man finds that the time spent on his jobs has an exponential distribution with mean 30 min. 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?

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Code: 9ABS304

2

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

PROBABILITY & STATISTICS

(Computer Science and Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 In a certain college 25% boys and 10% of girls are studying Mathematics. The girls constitute 60% of the students. If a student is selected and is found to be studying mathematics find the probability that the student is a (i) girl (ii) boy.

2 A continuous random variable x has a probability density function $f(x)=3x^2, 0 \le x \le 1$. Find a and b such that (i) $P\{x \le a\}=P\{x > a\} and$ (ii) $P\{x \ge b\}=0.05$

3 (a) A box contains 9 cards numbered 1 to 9. If four cards are drawn with replacement. What is the probability that none is 1?

(b) An insurance agent accepts policies of 5 men all of identical age and good in health. The probability that a man of this age will be alive 30 years is 2/3. Find the probability that in 30 years. (i) All five men (ii) At least one man (iii) Almost three will be alive

4 (a) The claim that the variance of a normal population is $\sigma^2=25$ is to be rejected if the variance of a random sample of size 16 exceeds 54.668 or is less than 12.102. What is the probability that this claim will be rejected even though $\sigma^2=25$.

(b) The claim that the variance of a normal population is $\sigma^2=4$ is to be rejected if the variance of a random sample of size 9 exceeds 7.7535. What is the probability that this claim will be rejected even though $\sigma^2=4$?

5 (a) Find the degree of confidence to assert that the average salary of the school teachers is between Rs. 272 and Rs. 302 if a random sample of 100 such teachers revealed a mean salary of Rs. 287 with S.D. of Rs. 48.

(b) Using the mean of a random sample of size 150 to estimate the mean mechanical aptitude of mechanics of a large workshop and assuming σ = 6.2, what can we assert with 0.99 probability about the maximum size of the error?

(c) In 6 determinations of the melting point of tin, a chemist obtained a mean of 232.26`C with a S.D. of 0.14`C. If he uses this mean as the actual melting point of tin, what can the chemist assert with 98% confidence about the maximum error?

Contd. in Page 2

6 (a) In a sample of 600 students of a certain college 400 are found to use ball pens. In another college from a sample of 900 students 450 were found to use ball pens. Test whether 2 colleges are significantly different with respect to the habit of using ball pens.

(b) It is claimed that a random sample of 100 tires with a mean life of 15269 is drawn from a population of tires which has a mean life of 15200 km and a S.D. of 1248 km. Test the claim at α = 0.05.

7 The following is the distribution of the hourly number of trucks arriving at a company's warehouse.

Trucks arriving	0	1	2	3	4	5	6	7	8
Frequency	52	151	130	102	45	12	5	1	2

Fit a Poisson distribution and test for goodness of the fit at $\alpha = 0.05$ level of significance.

8 A toll gate is operated on a freeway where cars arrive according to a Poisson distribution with mean frequency of 1.2 cars per min. The time of completing payment follows an exponential distribution with mean of 20 sec. Find

(i) the idle time of the counter;
(ii) average number of cars in the system;
(iii) average number of cars in the queue;
(iv) average time that a car spends in the system;
(v) average time that a car spends in the queue;
(vi) the probability that a car spends more than 30 sec. in the system?

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Code: 9ABS304

3

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

PROBABILITY & STATISTICS

(Computer Science and Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 There are three boxes I, II and III. Box I contains 4 red, 5 blue and 6 white balls. Box II contains 3 red, 4 blue and 5 white balls. Box III contains 5 red, 10 blue and 5 white balls. One box is chosen and one ball is drawn from it, what is the probability that:
(i) Red ball is drawn(ii) Blue ball is drawn(iii) White ball is drawn

2 The distribution function of a random variable x is given by

F(x) = $1-(1+x)e^{-x}, x \geq 0$

= 0 for x<0

Find the corresponding density function.

3 The mean of binomial distribution is 3 and variance is $^9/_4$.

Find (i) The value of n (ii) $P(x \geq 1)$ (iii) $P(x \leq 7)$ (iv) $P(1 \leq x < 6)$

4 The guaranteed average life of a certain type of electric bulb is 1500 hrs with a standard deviation of 120 hrs. It is decided to sample the output so as to ensure that 95% of the bulbs do not fall short of the guaranteed average by more than 2.5%. What will be the minimum sample size?

5 (a) A random sample of 20 fuses subjected to overload has mean time for blow of 10.63 min. with S.D. of 2.48 min. What can we assert with 95% confidence about the maximum error if we use $\bar{x}$ = 10.63 min. as a point estimate of true average it takes such fuses for blow when subjected to overload.

(b) Determine the 99% confidence interval for the true mean weight loss of 16 persons on diet control after one month had a mean weight loss of 3.42 kgs. with S.D. of 0.68 kgs.

Contd. in Page 2

6 (a) In a sample of 500 people in Tamil Nadu 280 are tea drinkers and the rest are coffee drinkers. Can we assume that both coffee and tea drinkers are equally popular in this state at 1% level of significance?

(b) The mean breaking strength of the cables supplied by a manufacturer is 1800 with a S.D. of 100. By a new technique in the manufacturing process, it is claimed that the breaking strength of the cables have increased. In order to test this claim, a sample of 50 cables is tested. It is found that the breaking strength is 1850. Can we support the claim at 1% level of significance?

7 In an investigation on the machine performance, the following results are obtained:

	No. of units inspected	No. of defectives
Machine I	375	17
Machine II	450	22

Test whether there is any significant performance of two machines at $\alpha = 0.05$ level of significance.

8 Customers arrive at the First Class Ticket counter of a theater at a rate of 12 per hour. There is one clerk serving the customer at the rate of 30 per hour. The arrivals are Poisson in nature and the service time follows exponential distribution.
Find
(i) Probability that there are no customers at the counter.
(ii) Probability that there are more than two customers at the counter.
(iii) Probability that there is no customer waiting to be served.
(iv) Probability that a customer is being served and nobody is waiting.

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Code: 9ABS304

4

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

PROBABILITY & STATISTICS

(Computer Science and Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) A lot contains 20 articles. The probability that the lot contains exactly 2 defective articles is 0.4 and that lot contains exactly 3 defective articles is 0.6. Articles are drawn from the lot at random one by one without replacement and are tested till all defective articles are found. What is the probability that testing procedure ends at the twelfth testing?

(b) In a bolt factory, machines A,B and C manufacture 25%, 35%, 40% respectively of the total of their output 5%, 4% and 2% are defective. A bolt is drawn and is found to be defective. What are the probabilities that it was manufactured by the machines A, B and C?

2 The diameter of an elective cable say X is assumed to be a continuous random variable with p.d.f of $f(x)=kx(1-x^2)\,in\,0\le x\le 1=0$ elsewhere find the value of k and $P(0\le x\le 1/2),\ P(x\ge 1/4)$.

3 Five dice were thrown together 96 times. The number of times 4, 5, 6 was actually thrown is given below. Calculate the expected frequencies.

No. of dice	0	1	2	3	4	5
Frequencies	1	10	24	35	18	8

4 A population consists of six numbers 4, 8, 12, 16, 20, 24 consider all samples of size two which can be drawn without replacement from this population. Find

(i) The population mean

(ii) The population standard deviation

(iii) The mean of the sampling distribution of means

(iv) The standard deviation of the sampling distribution of means verify (iii) and (iv) from (i) and (ii) by use of suitable formulae.

Contd. in Page 2

5 (a) A sample of size 64 and mean 60 was taken from a population whose S.. is 10. Find the 95% confidence interval for the mean.

(b) The management of the manufacturing firm wishes to determine the average time required to complete a certain manual operation. There should be 0.95 confidence that the error of estimate will not exceed 1/2 min. Find the sample size to be required if the S.D. is 2 min.

6 (a) Test performed with a random sample of 40 diesel engines produced by a large manufacturer show that they have a mean thermal efficiency of 31.45% with a S.D. of 1.6%. At the 0.01 level of significance test the null hypothesis $\mu = 32.3\%$ against the alternative hypothesis $\mu \neq 32.3\%$.

(b) A random sample of 1000 men from northern India gives their mean wage to be Rs. 30 per day with a S.D. of Rs. 1.50. A sample of 1500 men from southern India gives a mean of Rs. 32 per day with S.D. of Rs. 2. Discuss whether the mean rate of wages varies between the two regions.

7 (a) A machine which produces mica insulating washers for use in electric devices is set to turn out washers having a thickness of 10 mm. A sample of 10 washers has an average thickness 9.52 mm with a S.D. of 0.6 mm. Calculate student's – t

(b) The time taken by workers in performing a job method I and method II are given below.

Method I	20	16	26	27	23	22	-
Method II	27	33	42	35	32	34	38

Do the data show the variances of time distribution from population from which these samples are drawn do not differ significantly?

8 The arrival rate of the telephone calls at a telephone booth is according to Poisson distribution with an average time of 12 min. between two consecutive call arrivals. The length of telephone calls is assumed to be exponentially distributed with mean 4 min.
(i) Find the probability that a caller arriving at a booth will have to wait?
(ii) Find the average queue length forms from time to time?
(iii) Find the fraction of a day that the phone will be in use?
(iv) What is the probability that an arrival will have to wait for more than 15 min. before the phone is free?
(v) The telephone company will install a second booth when convinced that an arrival would expect to have to wait at least 5 min for making the call. Find the increase in flow of arrivals which will justify a second booth?

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Code: 9A02306

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

BASIC ELECTRICAL ENGINEERING

(Common to CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Define and explain Kirchoff's laws.

(b) Define and explain resistance, inductance and capacitance.

2 (a) Explain the steps for solving a network problem using Thevenin's theorem.

(b) Find the current I in the circuit shown in fig. 7

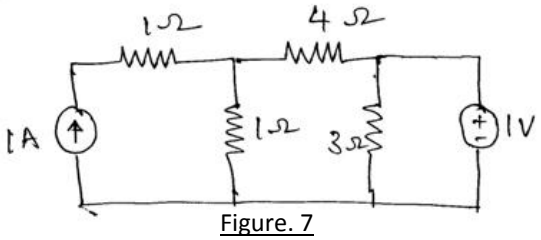

Figure. 7

3 (a) Derive the expression for impedance of RLC parallel circuit

(b) A coil having a resistance of 10 ohms and an inductance of 0.2 H is connected in series with a 100×10^{-6} F capacitor across a 230 V, 50 Hz supply, Calculate i) The active and reactive components of the current ii) the voltage across the coil, Draw the phasor diagram.

4 (a) Discuss the constructional features of transformers. Draw neat diagrams.

(b) Calculate the flux in the core of a single – phase transformer having a primary voltage of 230 V, at 50 Hz and 50 turns. IF the flux density in the core is 1 Tesla, calculate the net cross – sectional area of the core.

5 (a) Explain the types of DC generators in detail.

(b) A lap wound DC generator having 80 slots with 10 conductors per slot generates at no load emf of 400 V, when running at 1000 rpm. At what speed should it be rotated to generate a voltage of 220 V on open circuit.

6 (a) What is the significance of back emf generated in a DC machine, hence explain the principle of operation of a DC motor.

(b) A 100 V series motor takes 45 A when running at 750 rpm. Its armature resistance is 0.22 ohms, while the series field resistance is 0.13 ohms. Iron and frictional losses amounts to 750 W. Find the shaft power.

7 A 3-phase, 2-pole 50 Hz induction motor has a slip of 4% at no-load and 6% at full load. Find (i) Synchronous speed (ii) Full-load speed (iii) No-load speed (iv) Frequency of rotor current at stand still (v) Frequency of rotor current at full load.

8 With neat diagrams, explain the types of moving iron instruments with their working principles.

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Code: 9A02306

2

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

BASIC ELECTRICAL ENGINEERING

(Common to CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Derive an expression for the effective resistance of three resistors connected in parallel.
(b) Derive an expression of energy stored in a capacitance from the fundamentals.
(c) State Ohm's law. What are its limitations?

2 (a) Explain passive elements in detail.
(b) Derive the equation for delta to star transformation

3 (a) In a series RLC circuit, an A.C. voltage of 120 ∟0 V is applied at a frequency of 400 rad/sec. The input current leads the voltage by 63.5º. Find the value of R if L = 25 mH and c = 50 μF. What are the drops across L and C?
(b) Obtain RMS value of full wave rectifier.

4 (a) Derive an emf equation of a single phase transformer.
(b) The maximum flux density in the core of 250 /3000 Volts 50 HZ single phase transformer is 1.2 webers per square meter. If the emf per turn is 8 volts determine primary and secondary turns and area of the core.

5 (a) Explain the type of compound generator with neat circuit diagram.
(b) A long shunt, compound generator delivers a load current of 50 A at 500 V and has armature, series field and shunt field resistance of 0.05 ohm, 0.03 ohm and 250 ohm respectively. Calculate the generated emf and the armature current. Allow 1.0 V for branch for contact drop.

6 A 200 V dc shunt motor develops an output of 16.9 kW when taking an input of 20.2 kW. The field winding resistance is 50 ohm and armature resistance is 0.06 ohm. Calculate the efficiency and power input when the output is 7.35 kW.

7 A 3-phase, 4 poles, 50 Hz induction motor has a star-connected wound rotor. The rotor emf betweer slip rings at standstill is 50 V. The rotor resistance and standstill
reactances are 0.3 Ω and 3 Ω respectively. Find
(i) Rotor currents per phase at starting and slip rings short circuited
(ii) Rotor currents per phase at starting if a star connected rheostat of 4 Ω per phase is connected across the slip rings.
(iii) Rotor emf when the motor is running at full load at 1450 rpm.
(iv) Rotor current at full load and rotor power factor at full load

8 (a) Explain the type of eddy current damping control used in the measuring instruments with neat diagram.
(b) A moving coil instrument has a resistance of 12 Ω and gives a full-scale deflection when carrying 50 mA. Show how it can be adopted to measure current up to 100 A.

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Code: 9A02306

3

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

BASIC ELECTRICAL ENGINEERING

(Common to CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Explain the passive elements in detail.

(b) Three resistors of 5 ohm, 10 ohm and 15 ohm are joined in parallel. If the current in 10 ohm resistor is 3 A, what is the current in other resistors and the total current?

2 (a) State and explain the Superposition theorem.

(b) Find the current in the 6 ohm resistor using Superposition theorem. as shown in fig.9

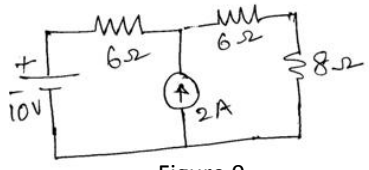

Figure.9

3 (a) Derive the equation for true power in an ac circuit.

(b) Derive the equation of impedance and power factor of RLC series circuit.

4 (a) Explain the principle of operation of a single – phase transformer when it supplies lagging power factor load.

(b) Derive the emf equation of a single phase transformer and draw the no load phasor diagram

5 (a) Explain the types of DC generators in detail.

(b) A lap wound DC generator having 80 slots with 10 conductors per slot generates at no load emf of 400 V, when running at 1000 rpm. At what speed should it be rotated to generate a voltage of 220 V on open circuit.

6 (a) What is the significance of back emf generated in a DC machine, hence explain the principle of operation of a DC motor.

(b) A 100 V series motor takes 45 A when running at 750 rpm. Its armature resistance is 0.22 ohms, while the series field resistance is 0.13 ohms. Iron and frictional losses amounts to 750 W. Find the shaft power.

7 A 3-phase, 2-pole 50 Hz induction motor has a slip of 4% at no-load and 6% at full load. Find (i) Synchronous speed (ii) Full-load speed (iii) No-load speed (iv) Frequency of rotor current at stand still (v) Frequency of rotor current at full load.

8 With neat diagrams, explain the types of moving iron instruments with their working principles.

*****

Code: 9A02306

4

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

BASIC ELECTRICAL ENGINEERING

(Common to CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Explain Kirchoff's laws with an example.

(b) Consider a 230 V, 100 W incandescent lamp. Determine (i) the lamp resistance (ii) the lamp current and (iii) the energy consumed in 8 hours.

2 Explain the following:

(a) Superposition theorem

(b) Thevinin's Theorem

3 (a) Derive the equation for power factor of RLC circuit.

(b) An RC parallel circuit consists of a resistance of 10 ohm and an inductance of 0.04 μF connected to a 100 V, 50 Hz source. Calculate (i) The total current (ii) power factor and (iii) the true power of the circuit.

4 (a) Explain the principal of operation of transformer. Derive its e. m. f. equation.

(b) Write short notes on the construction of transformers.

5 (a) Explain the type of compound generator with neat circuit diagram.

(b) A long shunt, compound generator delivers a load current of 50 A at 500 V and has armature, series field and shunt field resistance of 0.05 ohm, 0.03 ohm and 250 ohm respectively. Calculate the generated emf and the armature current. Allow 1.0 V for branch for contact drop.

6 A 200 V dc shunt motor develops an output of 16.9 kW when taking an input of 20.2 kW. The field winding resistance is 50 ohm and armature resistance is 0.06 ohm. Calculate the efficiency and power input when the output is 7.35 kW.

7 A 3-phase, 4 pole, 50 Hz induction motor has a star-connected wound rotor. The rotor emf between slip rings at standstill is 50 V. The rotor resistance and standstill reactances are 0.3 Ω and 3 Ω respectively. Find

(i) Rotor currents per phase at starting and slip rings short circuited

(ii) Rotor currents per phase at starting if a star connected rheostat of 4 Ω per phase is connected across the slip rings.

(iii) Rotor emf when the motor is running at full load at 1450 rpm.

(iv) Rotor current at full load and rotor power factor at full load

8 (a) Explain the type of eddy current damping control used in the measuring instruments with neat diagram.

(b) A moving coil instrument has a resistance of 12 Ω and gives a full-scale deflection when carrying 50 mA. Show how it can be adopted to measure current up to 100 A.

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Code: 9A04301

1

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

ELECTRONIC DEVICES & CIRCUITS

(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE and MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Write the diode equation and discuss the effect of temperature on diode current.

(b) Explain about avalanche and zener breakdown.

2 (a) For a full wave rectifier with shunt capacitance filter derive expression for ripple factor using approximate analysis.

(b) Why filter circuit is necessary with rectifiers. Give the list of different filters used in rectifier and their merits and demerits.

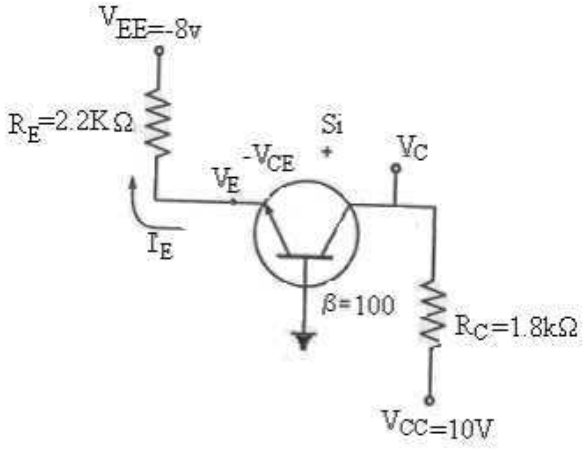
3 (a) Draw a diagram showing various currents in a PNP transistor in common collector mode.

(b) Explain the operation of a PNP bipolar junction transistor in CC configuration.

(c) Draw the common collector transistor characteristics.

4 (a) Explain in detail about thermal runaway and thermal resistance.

(b) For the circuit shown below, determine I_E, V_C and V_{CE} . Assume V_{BE} = 0.7 V



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5 (a) Explain the principle of MOSFET in depletion mode with neat sketches and o/p characteristics.

(b) Explain the different parameters of FET.

6 (a) JFET amplifier with voltage dividing biasing circuit has the following parameters. V_P = -2 V, I_{DS} = 4 mA, r_d = 910 Ω, R_S = 3 KΩ, R_1= 12 MΩ, R_2 = 8.57 MΩ, V_{DD} = 24 V. Find the value of drain current I_D at operating point.
Verify whether FET will operate in pinch-off region or not.

(b) How FET is used as a voltage variable resistor.

7 (a) A transistor with h_{ie} = 1.1 K, h_{fe} = 50, h_{re} = 2.5 X 10^{-4}, h_{oe} = 25 μA/V is connected in CE configuration as shown in figure 1. Calculate A_I, A_V, R_I, R_0.

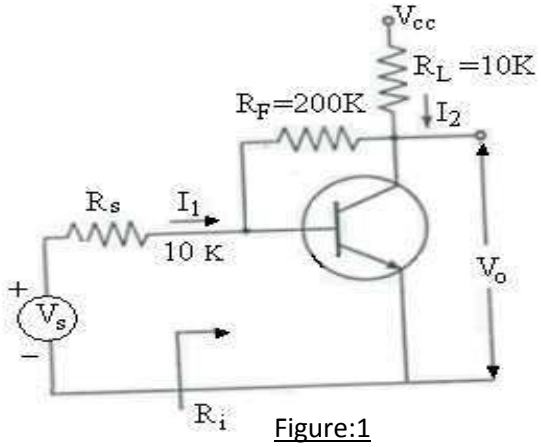

Figure:1

(b) Analyze a single stage transistor amplifier using h - parameters.

8 (a) Explain the working principle of an LED with its characteristics.

(b) What is a tunnel diode? Draw the V-I characteristics of such a diode and explain the occurrence of the negative differential resistance.

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Code: 9A04301

2

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

ELECTRONIC DEVICES & CIRCUITS

(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE and MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Draw the energy band diagram of p-n diode for no bias, forward bias and reverse bias.

(b) What are general specifications of p-n junction diode?

2 (a) Draw the circuit diagram of full-wave rectifier with inductor filter.

(b) A full-wave rectified voltage of 18 V peak is applied across a 500 µF filter capacitor. Calculate the ripple and d.c. voltages if the load takes a current of 100 mA.

3 (a) Define α_{dc} and β_{dc} of a transistor.

(b) Explain the input and output characteristics of a transistor in CB configuration.

4 (a) Prove that stability factor $S^{11}= \dfrac{(I_C - I_{C01})S}{\beta(\beta+1)}$

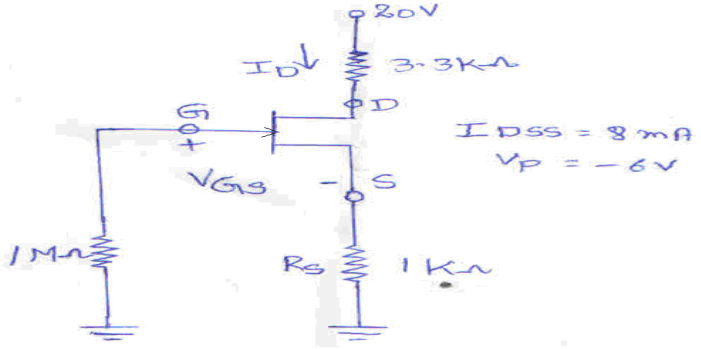
(b) Why biasing is necessary for a transistor circuit in a given configuration? Mention the three different types of biasing a Bipolar Junction Transistor.

5 (a) Why we call FET as a voltage controlled device?

(b) Draw the drain characteristics of depletion type MOSFET. Explain clearly different operating regions in characteristics with proper reasoning.

6 (a) Draw the small signal model of FET amplifier in CS connection and derive the equation for voltage gain, input impedance and output impedance.

(b) Determine the following for the circuit shown below: (i) V_{GSQ} (ii) I_{DQ} (iii) V_{DS} (iv) V_S



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7 (a) A transistor used in CE amplifier connection has the following set of h parameters, h_{ie} = 1KΩ, h_{fe} = 100, h_{re} = 5×10^{-4}, h_{oe} = $2\times10^{-5}\Omega^{-1}$, R_s = 15 KΩ, R_L= 5 KΩ. Determine input impedance, output impedance, current gain and voltage gain.

(b) Draw the hybrid parameter equivalent circuit for an n-p-n common emitter transistor and briefly explain.

8 (a) With a neat circuit diagram explain two transistor analogy of an SCR and explain its working with the help of V-I Characteristics.

(b) Describe the construction of a light-emitting diode and explain its operational mechanism.

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Code: 9A04301

3

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

ELECTRONIC DEVICES & CIRCUITS

(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE and MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Explain about various current components in a forward biased p-n junction diode.

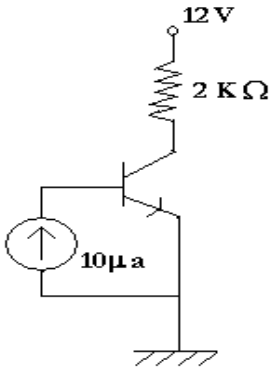
(b) Find the value of D.C. resistance and A.C resistance of a Germanium junction diode at 25^0 C with I_0 = 25 μ*A* and at an applied voltage of 0.2 V across the diode.

2 (a) Discuss a full wave rectifier with π-filter.

(b) Compare the performance of L-section and π-filters.

3 (a) Discuss qualitatively the conditions of flow of currents through a NPN Transistor contributing to the fact that Emitter current is the sum of Collector and Base currents.

(b) A silicon transistor with V_{BE} = 0.7 V, α = 0.98 and collector cut-off current of 10 μA is connected as shown below. Find (i) β *and* I_{CO} (ii) I_C and I_E



4 (a) Draw a BJT fixed bias circuit and derive the expression for the stability factor 'S'.

(b) An NPN transistor with β = 50 is used in a common emitter circuit with V_{CC} = 10 V, R_C = 2 KΩ. The bias is obtained by connecting a 100 KΩ resistance from collector to base. Assume V_{BE} = 0.7 V. Find (i) the quiescent point and (ii) the stability factor, S

Contd. in Page 2

5 (a) What are the differences between BJT and FET?
(b) Draw the small signal model of common source MOSFET amplifier and define all parameters.

6 (a) Draw two biasing circuits for an enhancement type MOSFET and explain.
(b) Calculate the value of R_S required to self bias an n-channel JFET with I_{DSS} = 40 mA, V_P = -10 V, V_{GSQ} = -5 V.

7 (a) The figure 2 shows a CE amplifier with collector to base bias. Calculate A_I , A_V , R_I . The transistor parameters are h_{ie} = 1.1 K, h_{fe} = 50, h_{oe} = 25 x 10^{-6} A/V, h_{re} = 2.5 x 10^{-4}.

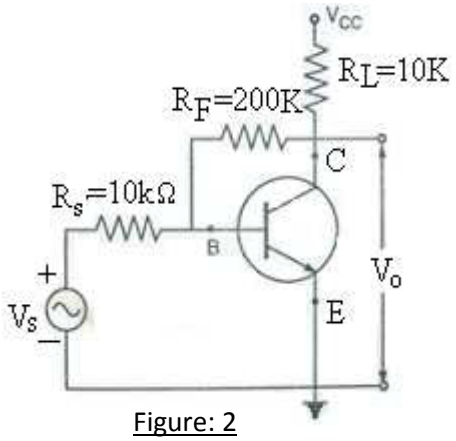


Figure: 2

(b) Draw the circuit diagram of CE amplifier with emitter resistance and obtain its equivalent hybrid model and derive expressions for A_I, R_I, and A_V. Use approximate analysis.

8 (a) Explain the V-I characteristics and the features of Tunnel diode.
(b) If V*E*<V*P* and V*E*>V*P*, explain how UJT works for these conditions.

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Code: 9A04301

4

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

ELECTRONIC DEVICES & CIRCUITS

(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE and MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Explain about Forward bias and Reverse bias in the case of a p-n junction diode.

(b) Draw the band diagram of PN junction under open circuit conditions and explain.

2 (a) Calculate the value of capacitance to use in a capacitor filter connected to a full wave rectifier operating at a standard aircraft power frequency of 400 Hz, if the ripple factor is 10% for a load of 500 Ω.

(b) Explain the working of the Half wave rectifier circuit using signal waveforms at various points in the circuit.

3 (a) Explain the input and output characteristics of a transistor in CB configuration.

(b) Calculate the collector current and emitter current for a transistor with α_{dc} = 0.99 and I_{CBO} = 50 μA when the base current is 20 μA.

4 (a) Explain the criteria for fixing operating point.

(b) List out the different types of biasing methods.

5 (a) Discuss FET small signal low frequency model.

(b) Sketch the cross section of an NMOS enhancement transistor and briefly explain.

6 (a) Draw the circuit diagram of common source JFET amplifier and derive the expressions for input resistance and output resistance.

(b) How should the gate-source junction of a JFET be biased? Explain how the potential applied to this junction controls the drain current.

7 (a) Derive the input impedance, output impedance, voltage gain, current gain in CC configuration using approximate model.

(b) A CE amplifier is drawn by a voltage source of internal resistance r_s = 1000 Ω. The h-parameters are h_{ie} = 1 KΩ, h_{re} = 2 x 10^{-4} , h_{fe} = 50, h_{oe} = 25 μA/V. Calculate the current gain, voltage gain and output resistance using exact analysis.

8 (a) Draw the two transistor version of an SCR and explain its firing characteristics with this circuit.

(b) Write a brief note on light dependent resistor.

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Code: 9A04306

B.TECH II Year I Semester (R09) Regular & Supplementary Examinations November 2012

DIGITAL LOGIC DESIGN

(Computer Science & Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

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1. (a) Convert the following numbers into equivalent decimal numbers (i) $(10110.0101)_2$ (ii) $(26.24)_8$ (iii) $(FAFA.B)_{16}$ (iv) $(ABCD)_{16}$.
   (b) Perform subtraction on the given unsigned binary numbers using the 2's complement of the subtrahend. (i) 10011-1001 (ii) 100111-100011 (iii) 110011-101101.

2. (a) Simplify the following Boolean expressions to minimum number of variables.
   (i) $xyz + x^1y + xyz^1$ (ii) $(A+B)^I (A^I+B^I)^I$.
   (b) Find the complement of the following expressions
   (i) $F_1 = x^1yz^1 + x^1y^1z$ (ii) $x(y^1z^1 + yz)$

3. (a) Simplify the following Boolean function using k.map
   $$F(w, x, y, z) = \Sigma(0,1,2,4,5,6,8,9,12,13,14)$$
   (b) Draw a NAND logic diagram that implements the complement of the following function
   $$F(A, B, C, D) = \Sigma(0,1,2,3,4,8,9,12)$$

4. (a) Design a combinational circuit that generates the 9's complement of a BCD digit.
   (b) Design s binary multiplier that multiplier two 4 bit numbers. Use AND gates and binary adders.

5. (a) Draw the circuit of a D-batch and explain its working with the help of its truth table.
   (b) Describe Mealy and Moore Models with help of circuit diagrams. State diagrams and state tables.

6. Design a serial 2's complementer, with a shift register and slipslop. The binary number is shifted out from one side and it's 2's complement shifted into other side of the shift register.

7. Design a BCD to excess – 3 code converter using
   (a) ROM (b) PAL.

8. An asynchronous sequential circuit is described by the excitation and output functions
   $$y = x_1x_2^1 + (x_1 + x_2^1)y; z = y$$
   (a) Draw the logic diagram of the circuit.
   (b) Derive the transition table and output map.
   (c) Obtain a two-state table.
   (d) Describe the behavior of the circuit.

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Code: 9A04306

2

B.TECH II Year I Semester (R09) Regular & Supplementary Examinations November 2012

DIGITAL LOGIC DESIGN

(Computer Science & Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1. (a) Convert the following numbers into equivalent decimal numbers. (i) $(11000.1110)_2$ (ii) $(37.55)_8$ (iii) $(B37.A2)_{16}$ (iv) $(FF005)_{16}$
   (b) Perform subtraction on the given unsigned binary numbers using the 2's complement of the subtrahend.
   (i) 111100-110011 (ii) 011110-001111 (iii) 111110-101010

2. (a) Reduce the following Boolean expressions to the minimum number of literals.
   (i) $A^lC^l+ABC+AC^l$ (ii) $(x^1y^1 + z)^1 + z + xy + wz$.
   (b) Find the complement of $F = x + yz$ and then show that $FF^l=0$ and $F+F^l=1$

3. Simplify the following Boolean expressions using four-variable k-maps
   (a) $A^lB^lC^lD^l+AC^lD+B^lCD^l+A^lBCD+BC^lD$.
   (b) $x^1z + w^1xy^1 + w(x^1y + xy^1)$

4. (a) Draw the logic diagram of a 2 to 4 line decoder using NOR gates only. Include on enable input.
   (b) Realize a full and adder using 4x1 multiplexer.

5. A sequential circuit with two D-flipflops A and B; two inputs x and y and one output z is specified by the following next state and output equations.

$$A(t+1) = x^1y + xA; B(t+1) = x^1B + xA; z = B.$$

   (a) Draw the logic diagram of the circuit.
   (b) Give the state table for the sequential circuit.
   (c) Draw the corresponding state diagram.

6. Show that a BCD ripple counter can be constructed using a 4 bit binary ripple counter with asynchronous clear and a NAND gate that detects the occurrence of count 1010.

7. A combinational circuit is defined by the functions:
   $F_1(ABC)=Em(3,5,6,7)$
   $F_2(ABC)=Em(0,2,4,7)$
   Implement the circuit with a PLA having three inputs, four product terms and two outputs.

8. An asynchronous sequential circuit has two internal states and one output. The excitation and output functions describing circuits are

$$Y_1 = x_1x_2 + x_1y_2^1 + x_2^1y_1; Y_2 = x_2 + x_1y_1^1y_2 + x_1^1y_1 \; ; \; z = x_2 + y_1$$

   (a) Draw the logic diagram of the circuit.
   (b) Derive the transition table and output map.
   (c) Obtain a flow table for the circuit.

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Code: 9A04306 3

B.TECH II Year I Semester (R09) Regular & Supplementary Examinations November 2012

DIGITAL LOGIC DESIGN

(Computer Science & Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1. (a) Convert the following numbers into equivalent decimal numbers
   (i) $(11110.0011)_2$ (ii) $(57.23)_8$ (iii) $(D723.F6)_{16}$ (iv) $(2CD5)_{16}$.
   (b) Perform subtraction on the given unsigned binary numbers using the 2's complement of the subtrahend.
   (i)11001100-01010101 (ii) 11101110-00101110 (iii) 01111110-00011111.

2. (a) Find the complement of the following expressions
   (i) $(x + y^1 + z)(x^1 + z^1)(x + y)$ (ii) $xy^1 + x^1y$.
   (b) Simplify the following Boolean expressions to the minimum number of literals.
   (i) $A^lB(D^l + C^lD)+B(A+ A^lCD)$ (ii) $xy + x(wz + wz^1)$

3. Simplify the following expressions and implement then with two –level NAND gate circuits:
   (a) $AB^l+ABD+ABD^1+A^lC^lD^l+A^lBC^l$.
   (b) $BD+BCD^l+AB^lC^lD^{l.}$

4. (a) Construct a 4 - to – 16- line decoder with line 2 – to- 4- line decoders with enable input.
   (b) Construct a 16 x 1 multiplexer with two 8 x 1 and one 2x1 multiplexers. Use block diagrams

5. A sequential circuit has two JK flip-flops A and B and one input x. The circuit is described by the following flip-flops input equations $J_A= x$; $K_A=B^1$; $J_B=x$; $K_B=A$
   (a) Derive the state equations A(t+1) and B(t+1) by substituting the input equations for the J and K variables.
   (b) Draw the state diagram of the circuit.

6. Draw the logic diagram of a 4-bit binary ripple down counter using (a) flip flops that trigger on the positive edge of the clock and (b)flip flops that trigger on the negative-edge of the clock.

7. Design a BCD to gray code converter, using
   (a) ROM (b) PAL.

8. The Boolean functions for the inputs of an SR batch are
   $S=x_1^1x_2^1x_3 + x_1x_2x_3$
   $R=x_1x_2^1 + x_2x_3^1$
   Obtain the circuit diagram using a minimum number of NAND gates.

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Code: 9A04306

4

B.TECH II Year I Semester (R09) Regular & Supplementary Examinations November 2012

DIGITAL LOGIC DESIGN

(Computer Science & Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1. (a) Convert the following numbers into equivalent decimal numbers
   (i) $(100111.1011)_2$ (ii) $(45.77)_8$ (iii) $(6A3B.D4)_{16}$ (iv) $(FFFF)_{16}$.
   (b) Perform subtraction on the given unsigned binary numbers using the 2's complement of the subtrahend.
   (i) (1110110-1011000 (ii) 1111100-1100011 (ii) 1100110-1000111.

2. (a) Convert the following expressions into sum of products and product of sums.
   (i) (AB+C)(B+C^{l}D) (ii) $x^1 + x(x + y^1)(y + z^1)$
   (b) Find the complement of the following expressions.
   (i) (AB^{l}+C)D^{l}+E (ii) $(x + y^1 + z)(x^1 + z^1)(x + y)$

3. (a) Implement the following Boolean expression with exclusive –OR and AND gates.
   F=AB^{l}CD^{l}+A^{l}BCD^{l}+AB^{l}C^{l}D+A^{l}BC^{l}D
   (b) Simplify the following Boolean function using five-variable map.
   $$F(A, B, C, D, E) = \Sigma(0,1,4,5,16,17,21,25,29)$$

4. (a) Design a BCD-to-decimal decoder using unused combinations of the BCD code as don't care conditions.
   (b) Implement a full-adder with two 4x1 multiplexers.

5. (a) Construct a JK flip-flop using a D flip-flop , a 2 –t0-1- line multiplexer and an invertors.
   (b) Draw a SR latch with NOR gates and explain its working with the help of the truth table.

6. Design a counter with the following repeated binary sequence: 0,1,2,3,4,5,6. Use JK flip flops.

7. Implements the following two Boolean functions using a PLA having three inputs, four product terms and two outputs.
   $$F_1(A, B, C) = \Sigma(0,1,2,4)$$
   $$F_2(A, B, C) = \Sigma(0,5,6,7)$$

8. Obtain a primitive flow table for a circuit with two inputs ,x_1 and x_2 and two outputs z_1 and z_2 that satisfy the following four conditions:
   (a)when x_1 x_2 =00, the output is $z_1 z_2 = 00$. (b) when $x_1 = 1$ and x_2 changes from 0 to 1 , the output is $z_1 z_2 = 01$. (c) when x_2 =1 and $x_1$changes from o to 1 , the output is $z_1 z_2 = 10$. (d) oth er wise , the output does not change.

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Code: 9A05301

1

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Explain conditional proposition with a suitable example.
(b) What is logical equivalence? Explain with an example.
(c) Explain about derived connectives using truth tables.

2 How the validity of an argument can be checked by using truth table? Give an example.

3 (a) What is a compatibility relation? Explain the procedure to find the maximal compatibility blocks.
(b) What is a partial order relations?

4 (a) Show that if a, b are arbitrary elements of a group G, then $(ab)^2 = a^2 b^2$ if and only if G is abelian.
(b) Let G = {1, -1, i, -i) be a multiplicative group. Find the order of every element.

5 (a) Find the coefficient of X^{16} in $(1 + X^4 + X^8)^{10}$
(b) Find a solution to $a_n - a_{n-1} = 3(n - 1)$ where $n \geq 1$ and where $a_0 = 2$.

6 In how many ways can we draw a heart or a spade from an ordinary deck of playing cards? A heart or an ace? An ace or a king? A card numbered 2 through 10? A numbered card or a king?

7 (a) Prove that a graph G is a tree if and only if G is loop free and has exactly one spanning tree.
(b) Explain incidence matrix representation of a graph.

8 Give an example of two nondirected graph with 4 vertices and 2 edges that are not isomorphic. Verify that they are not isomorphic?

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Code: 9A05301

2

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Explain the difference between the principle disjunctive and conjunctive normal forms.

(b) Define converse, contra positive and inverse of implication.

2 Show that (x) (p(x)) → q(x)) ^(x) ^(x) (q(x) → R(x)) ➔ (x) (p(x) → R (x)). Using Rule of inference.

3 (a) Determine the sets A & B given that A – B = { 1,2,4 } B – A = { 7,8 } and A U B = { 1,2,4,5,7,8,9}.

(b) For any two sets A & B prove that P(A ∩ B) = p(A) ∩ p (B) given an example to show that: P(A U B) ≠ p (A) U p (B).

4 Show that the intersection of any two congruence relations on a set also a congruence relation.

5 (a) Solve the recurrence relation $a_n - 8a_{n-1} + 21a_{n-2} = 0$, for n > = 2.

(b) Find a recurrence relation for the number of n-digit ternary sequences that have an even number of 0's.

6 (a) In how many ways can 10 people be seated in a row so that a certain pair of them is not next to each other?

(b) How many 10-permutations are there of {3.a, 4.b, 2.c, 1.d}?

7 Prove that if graph G is a connected planar graph then |V| - |E| + |R| = 2.

8 (a) Show that any graph with 4 or fewer vertices in planar.

(b) Show that $K_{3,2}$ is planar.

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Code: 9A05301

3

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 Find the D.N.F of [(p ^ q) v (p ^ ~ q)] ^ [(p ^ ~ q) v (~ p ^ ~ q)].

2 With reference to automatic theorem proving. Show that S v R is a tautologically implied by (p v q) ^ (p → r) ^ (q → s).

3 (a) Explain pigeon hole principle.

(b) Suppose there are 26 students & 7 cars to transport them then at least one car must have more than 4 passengers.

4 (a) In a group (G, o) is an element of order 30. Find the order of a^5 and a^{12}.

(b) If a and b are any two elements of a group (G, *) which commute show that:
(i) a^{-1} and b commute (ii) b^{-1} and a commute (iii) a^{-1} and b^{-1} commute

5 (a) Find the coefficient of X^{20} in $(X^3 + X^4 + X^5 + \ldots)^{20}$

(b) Solve the recurrence relation $a_n = (5a_{n-1})^2$ $n \geq 1$ and where $a_0 = 1$.

6 (a) A shoe store has 30 styles of shoes. If each style is available in 12 different lengths, 4 different widths and 6 different colors, how many kinds of shoes must be kept in stock?

(b) How many integral solutions are there to $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where $x_i >= 2$?

7 Show that a complete bipartite graph $k_{m, n}$ is planar if $m \leq 2n$ or $n \leq 2$.

8 (a) What is the chromatic number K_n?

(b) Prove that if G has an Eulerian circuit then G has an Hamiltonian circuit using an example.

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Code: 9A05301

4

B.Tech II Year I Semester (R09) Regular and Supplementary Examinations, November 2012

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSS, IT and CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 Show that the principal disjunctive normal form of the formula.
$P \vee (\sim p \rightarrow (q \vee (\sim q \rightarrow r))$ is Σ (1,2,3,4,5,6,7)

2 (a) Explain about the free and bound variables.
(b) show that $r \rightarrow s$ can be derived from the premises, $p \rightarrow (q \rightarrow s)$, $\sim r \vee p$ and q.

3 (a) Consider the poset A = ({1,2,3,4,6,9,12,18,36},/) find the greatest lower bound and least upper bound of the sets { 6, 18} and { 4,6,9}.
(b) Explain about greatest lower bound & least upper bound with an example.

4 (a) Let G = {2, 4, 6, 8} and the binary operation be multiplication modulo 10. Verify that H = {4, 6} is a subgroup of group (G, Θ_{10}).
(b) Let H be a subgroup of a group G and a EG. Let $aHa^{-1} = \{aha^{-1} / h \in H\}$.show that aha^{-1} is a subgroup of G and $O(H) = O(aHa^{-1})$.

5 (a) Find the form of a particular solution to $a_n - 5a_{n-1} + 6a_{n-2} = n^2 4^n$ for $n \geq 2$.
(b) Find the recurrence relation and give the initial conditions for the number of bit strings of length n that do not contain the pattern 11.

6 (a) In how many ways can a committee of 5 or more can be chosen from 9 people?
(b) How many ways are there to place 20 identical balls into 6 different boxes in which exactly 2 boxes are empty?

7 Prove that if a connected planar graph G has n vertices, e edges and r regions then n - e + r = 2.

8 (a) How many Hamiltonian cycles are there in a complete graph on 'n' vertices?
(b) Disprove by giving a counter example: Connected nonplanar graphs with 6 vertices are not 4-colorable.

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