Code: 9A05302

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ADVNACED DATA STRUCTURES
(Common to ECC, CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

1

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Explain the loop structures available in C++.
(b) Write a program to print prime numbers between two limits.

2 (a) Explain in detail about operator overloading.
(b) Write a note on virtual base classes with examples.

3 (a) Define data structure. List out various types of data structures.
(b) Describe in detail the array implementation of queues.

4 Short notes on
(a) Hash function.
(b) Separate chaining.
(c) Double hashing.

5 (a) Differentiate between internal and external sorting.
(b) Explain any one external sorting method with suitable example.

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

7 Explain the operations: insertion, deletion and searching in B-tree. Also write the procedure to find height of B-tree.

8 Analyze the running time of Boyer – Moore algorithm.

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Code: 9A05302

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ADVNACED DATA STRUCTURES
(Common to ECC, CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

2

Answer any FIVE questions
All questions carry equal marks
*****

1 Compare and contrast between splay tree and B-tree.

2 What are Tries? Explain the following:
(a) Standard Tries.
(b) Compressed Tries.
(c) Suffix Tries.

3 Write a C++ program to perform 2D matrix operations as follows:
(a) Define class MATRIX, use appropriate constructor.
(b) Define methods for the following two matrix operations: determinant and transpose.
(c) Write a main program to demonstrate the use of the MATRIX class and its methods.

4 (a) What is Dynamism? Explain any three kinds of dynamism for object-oriented design with an example for each.
(b) What is Compile time polymorphism? Explain with an example.

5 (a) Differentiate between the terms linear and non linear data structures.
(b) Explain the working of stacks and queues taking suitable examples.

6 (a) Explain how a hashing table can be represented?
(b) Describe any two hashing functions with example.

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

8 List the situations in which single rotations can be performed in an AVL tree. Explain them with suitable example.

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II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ADVNACED DATA STRUCTURES
(Common to ECC, CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

3

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) What are constructors and destructors? Explain how they differ from normal functions? Illustrate with an example.
(b) How does a structure in C and C++ differ? Explain with example.

2 (a) What is Containership? How does it differ from Inheritance?
(b) Write a function template for finding the minimum value contained in an array.

3 (a) Explain the linked list implementation of stack and write the procedures for its operations.
(b) Describe big 'O' notation used in algorithms.

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, 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) Discuss how deletions are carried out in priority queue.
(b) Write notes on external sorting.

6 (a) What is binary search tree? Construct the binary search tree for the following data
21, 6, 9, 4, 17, 24, 12, 10, 35, 31, 30, 13. What is the advantage of BST over a binary tree?
(b) Write notes on balanced trees.

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

8 Analyze the time complexity of Knuth-Morris-Pratt algorithm.

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Code: 9A05302

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ADVNACED DATA STRUCTURES
(Common to ECC, CSS, IT, & CSE)

Time: 3 hours Max Marks: 70 **4**

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) What are the keywords used in C++ for exception handling? Describe their usage with suitable example.
(b) Write short notes on object pointers.

2 (a) Explain the concept of template class by writing a C++ program for linear search with template.
(b) Explain different type conversions in C++ with suitable examples.

3 (a) Explain the big Oh notation.
(b) Compare recursion with iteration. Give example.

4 (a) Explain about the basics of Hashing technique.
(b) Differentiate between open hashing and closed hashing.

5 Explain in detail about priority queues and external sorting.

6 Write notes on AVL trees.

7 Explain the following basic splay tree operations:
(a) Insertion.
(b) Deletion.
(c) Searching.

8 Explain the following pattern matching algorithms:
(a) Brute force algorithm.
(b) Knuth-Morris-Pratt algorithm.

*****

Code: 9ABS304

1

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
PROBABILITY AND STATISTICS
(Computer Science & Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 A student appears for tests I, II and III. The student is successful if he passes either in test I and II or tests I and III. The probability of the student passing in test I, II, III are p, q and ½ respectively. If the probability that the student is successful is ½ then find the relation between p and q.

2 Find the mean of the probability distribution of the number of heads obtained in three flips of a balanced coin.

3 Fit a binomial distribution to the following data

X	0	1	2	3	4	5
f	2	14	20	34	22	8

4 The following are the times between six calls for an ambulance in a city and the patient's arrival at the hospital: 27, 15, 20, 32, 18 and 26 minutes. Use these figures to judge the reasonableness of the ambulance services claim that it takes on the average 20 minutes between the call for an ambulance and patient's arrival at the hospital?

5 (a) Define estimate, estimator and estimation.
(b) In how many ways the estimation can be done and what are they? Explain in detail.

6 (a) What is meant by Level of Significance?
(b) A die was thrown 9000 times and of these 3220 yielded a 3 or 4. Is this consistent with the hypothesis that the die was unbiased? (Use α = 0.01 as level of significance).
(c) In a random sample of 60 workers, the average time taken by them to get to work is 33.8 min. with a S.D. of 6.1 min. Can we reject the null hypothesis μ = 32.6 min. in favour of alternative hypothesis $\mu > 32.6$ at α = 0.025?

7 (a) Prices of shares of a company on the different days in a month were found to be 66, 65, 69, 70, 69, 71, 70, 63, 63, 64 and 68. Discuss whether the mean price of the shares in the month is 65?
(b) Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins show the sample S.D. of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test hypothesis that the true variances are equal.

8 Barber A takes 15 min. to complete one hair cut. Customers arrive in his shop at an average rate of one every 30 min. Barber B takes 25 min. to complete one hair cut and customers arrive at his shop at an average of one every 50 min. The arrival processes are Poisson and the service time follow an exponential distribution.
(i) Where would you expect a bigger queue?
(ii) Where would you require more waiting time including a hair cut?

*****

Code: 9ABS304

2

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
PROBABILITY AND STATISTICS
(Computer Science & Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Five persons in a group 20 are engineers. If three persons are selected at random, determine the probability that all engineers and the probability that at least one being an engineers.
(b) From a pack of 52 cards, three cards are drawn at random. Find the probability that two are aces and another is a king.

2 The probability mass function of a random variable X is zero except at the points x= 0, 1, 2. At these points, it has the values P(0) = $3c^3$, P(1) = $4c-10c^2$, P(2) = 5c-1 for some c>0
(i) Determine the value of c. (ii) Find P(x<1), P(x<2), $P(1 < x \le 2)$ *and* $P(0 < x < 3)$.
(iii) Find the largest value of X such that F(x) < 1/2.
(iv) Find the smallest value of X such that F(x)>1/2.

3 If a Poisson variate 2P(x=0) = $P(x = 2)$ find the probability that
(i) $P(x \le 3)$, (ii) $P(2 < x \le 5)$, (iii) $P(x \ge 3)$.

4 Find the mean and s.d of sampling distribution of variances for the population 2, 3, 4, 5 by drawing samples of size two (a) with replacement (b) without replacement (Sampling - distribution of variances).

5 (a) Give the difference between the interval estimation and the Bayesian estimation.
(b) The mean weight loss of n= 16 grinding balls after a certain length of time in mill slurry is 3.42 grams with a S.D. 0.68 grams. Find the maximum error of estimate at 99% confidence interval. Also construct a 99% confidence interval for the true mean weight loss of such grinding balls under the stated conditions.

6 (a) Write a note on one tailed test and two tailed test?
(b) The mean life time of a sample of 100 light tubes produced by a company is found to be 1560 hours with a population S.D. of 90 hours. Test the hypothesis for α = 0.05 that the mean life time of the light tubes produced by the company is 1580 hours.

7 (a) Write properties of t – distributioin.
(b) 8 students were given a test in Statistics and after one month coaching they were given another test of similar nature. The following table gives the increase 1 their marks in the second test over the first.

Students No.	1	2	3	4	5	6	7	8
Increase of Marks	4	-2	6	-8	12	5	-7	2

Do the marks indicate that the students have gained from the coaching.

8 (a) (a) Define unbiased estimator. What is the more efficient unbiased estimator, explain briefly?
(b) Show that $\bar{x}$ is an unbiased estimator of the population mean μ.
*****

Code: 9ABS304

3

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
PROBABILITY AND STATISTICS
(Computer Science & Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) a) What is the probability of picking an ace and a king from a 52 cards deck?
(b) For any three events A, B and C defined on the sample space S such that $B \subset C$ and P(A) > 0, show that P(B/A) $\leq$ P(C/A).

2 A random variable x has the following probability function

X=x	0	1	2	3	4	5	6	7
P(X=x)	0	k	2k	2k	3k	K^2	$2k^2$	$7k^2+k$

(i) Find the value of k. (ii) $P(x \leq 5) and\ P(x > 5)$. (iii) P(0<x<6).

3 A die is thrown 8 times. If getting a 2 or 4 is a success. Find the probability of (i) 4 success. (ii) $P(x \leq 3)$. (iii) $P(x \geq 2)$.

4 Samples of size 2 are taken the population 1, 2, 3, 4, 5, 6 (i) With replacement and without replacement. Find (i) The mean of population (ii) Standard deviation of the population.
(iii) Means of sampling distribution (iv) Standard deviation of the means of sampling distribution. Verify that means of sampling distribution is equal to the mean of population and standard deviations of the means of sampling distribution are not equal to the standard deviation of the population.

5 (a) What is the "interval estimation"? Give the relations used to find the confidence interval of large and small samples.
(b) A random sample of 400 items is found to have mean 82 and S.D. 18. Find the maximum error of estimation at 95% confidence interval. Find the confidence limits for the mean if x = 82?

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 To compare 2 kinds of bumper guards, 6 of each kind were mounted on a car and then the car was run into a concrete wall. The following are the costs of repairs.

Guard I	107	148	123	165	102	119
Guard II	134	115	112	151	133	129

Use 0.01 level of significance to test whether the difference between two sample mean is significant.

8 (a) Write about (M/M/1) : (∞/FIFO) Queuing system.
(b) Derive the formula for the probability distribution density function of the waiting time distribution.

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Code: 9ABS304 **4**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
PROBABILITY AND STATISTICS
(Computer Science & Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) A bag A contains 2 white and 3 red balls, and a bag B contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from the bag B.
(b) A man is known to speak the truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.

2 If X is a continuous random variable and Y = ax+b prove that E(1/y) = aE(x) + b and V(y) = a^2 V(x).

3 In a family of 5 children find the probability that there are
(i) 2 boys. (ii) At least one boy. (iii) All are boys. (iv) No boys,

4 Find the mena and s.d of sampling distribution of variances (S.D.V) for the population 2, 3, 4, 5 by drawing samples of size two
(a) With replacement.
(b) Without replacement.

5 (a) (a) Write a short note on interval estimation and Bayesian estimation.
(b) Measurements of the weights of a random sample of 200 ball bearing made by a certain machine during one week showed a mean of 0.824 and a S.D. of 0.042. Find maximum error at 95% confidence interval. Find the confidence limits for the mean if x = 32?

6 (a) (a) 20 people were attached by a disease and only 18 survived. Will you reject the hypothesis that the survival rate if attacked by this disease is 85% in favour of the hypothesis that is more at 5% level?
(b) A sample of 64 students has a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs and S.D. 25 kgs?

7 The nicotine contents in milligrams in two samples of tobacco were found to be as follows:

Sample A	24	27	26	21	25	-
Sample B	27	30	28	31	22	36

Can it be said that the two samples have come from the same normal population?

8 A car park contains 5 cars. The arrival of cars is Poisson with a mean rate of 10 per hrs. The length of time each car spends in the car park has negative exponential distribution with mean 2 hrs. How many cars are in the car park on average and what is the probability of a newly arriving customer finding the car park full and having to park his car elsewhere?

*****

Code: 9A02306

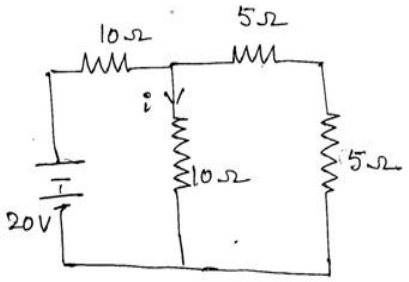
1

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
BASIC ELECTRICAL ENGINEERING
(Common to CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

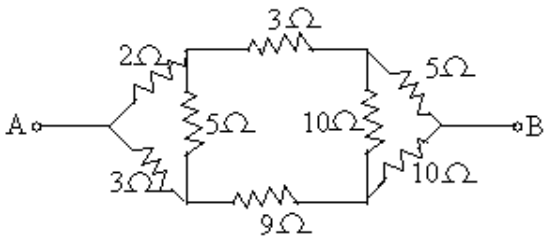
Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Find the current, i in the following Figure.



(b) Define and Explain Ohm's law.

2 (a)



Find the equivalent resistance between the terminals A and B of network shown in figure.

(b) State and explain superposition theorem.

3 Consider a general A.C circuit in which the current leads the applied voltage by an angle φ . Write the equation for the voltage and current and hence derive the equation for the power. Also plot the voltage, current and power wave forms.

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 operating principle of a DC generator in detail.

(b) A 4 – pole wave connected DC generator having 60 slots on its armature with 6 conductors per slot, runs at 750 rpm and generates an open circuit voltage of 230 V. Find the useful flux per pole.

6 The armature of a 4 –pole, lap connected DC shunt motor takes 200 A at speed of 500 rpm. The flux per pole 50 mWb. The number of armature turns is 500. The torque lost in windage, friction and iron losses can be assumed as 2.5 %. Calculate (i) The torque developed by the armature (ii) The shaft torque (iii) Shaft power in kW.

7 (a) Explain how the rotating magnetic field is developed in a 3-ø induction motor?

(b) A 6 pole, 3-ø induction motor runs at 960 rpm on full load when supplied from a 50Hz supply. Determine the synchronous speed and slip 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

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
BASIC ELECTRICAL ENGINEERING
(Common to CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 Explain the construction and working of Permanent Magnet Moving Coil instrument with neat diagram

2 A 3-phase, 8 pole, 60 Hz induction motor has a star-connected wound rotor. The rotor emf between slip rings at standstill is 50V.The rotor resistance and standstill reactances are 0.4Ω and 2Ω 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 5 Ω per phase is connected across the slip rings
(iii) Rotor emf when the motor is running at full load at 850 rpm.
(iv)Rotor current at full load and rotor power factor at full load

3 The armature of a 6 –pole, 6 circuit DC shunt motor takes 300 A at speed of 400 rpm. The flux per pole 75 mWb. The number of armature turns is 500. The torque lost in windage, friction and iron losses can be assumed as 2.5 %. Calculate (i) The torque developed by the armature (ii) The shaft torque (iii) Shaft power in kW.

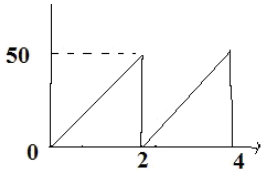
4 (a) Explain the type of series generator with neat circuit diagram.

(b) The armature of a 2 – pole, 220 V Lap wound generator has 400 conductors and runs at 300 rpm. Calculate the useful flux / pole if the number of turns in each field coil is 1200.

5 (a) Define and explain basic circuit elements.
(b) Define and explain KCL & KVL with neat diagram.

6 Derive the expression for the following
(a) Three resistors are connected in parallel; (b) Three inductors are connected in parallel
(c) Three capacitors are connected in parallel.

7 Determine the rms value and average value of the saw tooth waveform shown in figure. Calculate the form factor.



8 What is an ideal transformer and derive an expression for induced emf in a single phase transformer. Also explain its constructional details with neat diagram.

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Code: 9A02306

3

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
BASIC ELECTRICAL ENGINEERING
(Common to CSS, IT, & CSE)

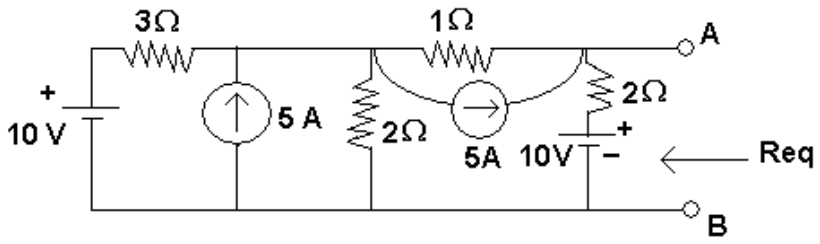
Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 A 500 -KVA, 3-phase 50 Hgs Transformer has a voltage Ratio (line voltages) of 33/11 KV and is Delta/Star connected. The resistances per phase are: High voltage 35 V, low voltage 876 V and the Iron loss is 3050 W. Calculate the efficiency at full load and one-half of full load respectively (a) at unity PF (b) 0.8 PF.

2 (a) Define and explain Kirchhoff's laws.
(b) Define and explain resistance, inductance and capacitance.

3 (a) State Thevenin's theorem.
(b) Find equivalent resistance as seen into terminals A and B in given Figure.



4 (a) A series R-L-C circuit consists of 100 ohms resistor and an inductor of 0.318 Henry and a capacitor of unknown value. This circuit is supplied by 230V, 50 HZ supply and draws a current of 2.3 ohms, and the current is in phase with the supply voltage. Find i) the value of the capacitance, and the power supplied by the source.
(b) Explain about 'j' operator

5 A DC shunt generator supplies a load of 75 kW at 440 V through feeders of resistance 0.135 ohm. The resistance of armature and shunt field windings is 0.045 and 150 ohms respectively. Calculate (i) Terminal voltage (ii) Shunt field current and (iii) Generated emf.

6 A 20 kW, 250 V dc shunt generator has armature and field resistances of 0.04 ohm and 200 ohm respectively. Determine the total armature power developed when working.
(i) As generator delivering 20 kW output and
(ii) As a motor taking 20 kW input.

7 A 3-ø 6 pole 50Hz cage motor is running with a slip of 4%.
Find (a) Speed of rotating field relative to stator winding; (b) Motor speed
(c) slip speed; (d) Frequency of the emf induced in the rotor;
(e) Speed of rotation of rotor mmf relative to rotor winding;
(f) Speed of rotor of rotor mmf relative to stator winding.

8 Explain the moving iron repulsion type instrument with a neat diagram.

*****

Code: 9A02306

4

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
BASIC ELECTRICAL ENGINEERING
(Common to CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Derive the equation for equivalent resistance when connected in (i) series (ii) parallel.
(b) Three resistors R_1,R_2 & R_3 are connected in series with a constant voltage source of 'V' volts. The voltage across R_1 is 4V, power loss in R_2 is 16W and the value of R_3 is 6 ohms. If the current flowing through the circuit is 2A, find the voltage 'V'.

2 (a) What is meant by EMF of a source?
(b) Distinguish between ideal and practical voltage source? Give examples?
(c) Distinguish between ideal and practical current sources? Give example?
(d) The internal resistance of a 12v − battery is a0.9 ohms. What will be its terminal voltage when the current drawn from the battery is 2 Amps

3 (a) Explain what do you understand by
(i) unidirectional current. (ii) alternating current. (iii) sinusoidal a.c. Current.
(b) Define the terms (i) R.M.S value. (ii) time period. (iii) frequency. (iv) average value.
(c) Find out average value and root mean square value of output waveform of full wave rectifier circuit. Assume the waveform has maximum voltage of 24V with 100Hz frequency.

4 Discuss the constructional details of single - phase transformer and hence obtain the expression for induced emf of a transformer.

5 A 440 V DC shunt motor draws a current of 250 A. The armature resistance is 0.02 ohm and shunt field resistance 50 ohm. Find the back emf. If the lap wound armature has 120 slots with 4 conductors per slot, at what speed will the motor run when the flux per pole is 0.04 Wb?

6 (a) What are the differences between a dc shunt motor and a dc series motor?
(b) The armature of a 6 – pole, 6 circuit dc shunt motor takes a current of 400 A at a speed of 350 rpm. The flux / pole is $80x10^{-3}$ Wb. The number of armature conductors is 1200 and it may be assumed that 3% of the torque is lost in windage, friction and iron losses. Calculate the brake horse power developed.

7 In the case of an 8-pole induction motor the supply frequency was 50Hz and the shaft speed was 735 rpm. What were the magnitudes of the following
(i)synchronous speed. (ii)slip speed. (iii)per unit slip. (iv)percentage slip.

8 Explain the types of damping devices used in the measuring instruments in detail with neat diagrams.

*****

Code: 9A04301

1

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ELECTRONIC DEVICES AND CIRCUITS
(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE & MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) With a neat diagram explain the working of an open circuited PN junction. Give necessary response curves.
(b) The current flowing in a germanium PN junction diode at room temperature in $9x10^{-7}$A, when the large reverse voltage is applied. Calculate the current flowing when 0.1V forward bias is applied.

2 (a) With a neat circuit diagram and necessary wave forms explain the operators of PN junction diode half wave rectifier.
(b) An ac supply of 220V is applied to a half wave rectifier circuit through a transformer with a turns ratio of 10:1. Find (i) dc output voltage. (ii) PIV. Assume the diode to an ideal one.

3 (a) Draw the circuit of a BJT in CB configuration and explain its input and output characteristics with neat curves.
(b) An NPN transistor with α=0.9 is connected in CB configuration and gives a reverse saturation current I_{co}=15μA. Calculate the base and collector currents for an emitter current of 4mA.

4 (a) Draw the fixed bias circuit a transistor and derive the relevant expressions/ equations for fixed dias.
(b) A fixed dias circuit with V_{CC}=10V, a resistor R_C=2kΩ is connected between V_{CC}(+) and collector, Rb=100kΩ is connected between base and collector. Find I_B, I_C and V_{CE} with β=100. Transistor is made of silicon.

5 (a) With a neat construction diagram explain the principle of operation of a JFET. Give its characteristics.
(b) An n-channel JFET has I_{DSS}=10mA and V_P=-2V. Determine the drain source resistance 'r_{DS}' for (i) V_{GS}=0V. (ii) V_{GS}=-0.5V.

6 (a) Explain and give the expression for self bias arrangement of a FET with a neat circuit diagram.
(b) A FET amplifier in the common source configuration uses a load resistance of 250kΩ and the transconductance is 0.5mA/V. What is the voltage gain of the amplifier? Given r_d=200kΩ.

7 (a) For an emitter follower circuit determine A_I, A_V ,R_I, and R_O.
(b) For the emitter follower with R_S=0.5kΩ and R_L=5kΩ, calculate A_I, R_i, A_{VS} and R_o. Assume h_{fe}=50, h_{ie}=1kΩ, h_{oe}=25μA/V.

8 Write short notes on the following
(a) Varacter diode.
(b) Uni junction transistor.

*****

Code: 9A04301

2

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ELECTRONIC DEVICES AND CIRCUITS
(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE, & MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Explain the working of a PN junction diode in both forward and reverse bias conditions along with characteristics.
(b) A diode reaches its maximum power rating of 2.5 watts when operating in the forward bias at the forward voltage of 900mv. Calculate
(i) The maximum allowable forward current I_f (max).
(ii) The forward diode resistance R_f.

2 (a) Explain the working of a full wave rectifier with a neat circuit diagram and with relevant wave forms.
(b) A full wave single phase rectifier employer a π-section filter consisting of two 4μF capacitors and one 20H choke. The load current is 50 μA. Calculate the DC output voltage and the ripple voltage. The resistance of the choke is 200Ω.

3 (a) Explain the operation of a BJT in CE configuration. Give its input – output characteristics. Define β.
(b) What is the value of α for a BJT that has a β of 90? Find the base and the emitter current if the collector current is 4mA.

4 (a) Give the analysis of a voltage – divider bias derive the necessary equations.
(b) In a transformer coupled amplifier stage, V_{CC}=12 V, R_C=4.3 KΩ V_{BE}=0.7 V and β=50. the quiescent voltage V_{CE} is 4V. Determine
(i) R_E. (ii) The stability factor 'S'.

5 (a) Explain the working of a depletion type MOSFET with a neat construction diagram and its characteristics.
(b) An n-channel depletion type MOSFET has I_{DSS}=10mA and V_p=-2v. Determine the actual value of drain to source resistance r_{DS} when (i) V_{GS}=1V. (ii) V_{GS}=2V.

6 (a) With a neat circuit diagram explain the operation of a voltage divider bias arrangement of JFET with necessary equations.
(b) The Q-point of a JFET in a source self – bias arrangement is chosen at V_{GS}=-1.5V and I_{Dsat}=2mA. Find the value of the resistance R_S.

7 (a) For a BJT derive the expressions for the current gain (A_I), voltage gain (A_V), input resistance (R_i) and output resistance (R_O).
(b) Design an emitter follower having R_i=500kΩ, R_O=20Ω. Assume h_{fe}=50, h_{ie}=1kΩ, h_{oe}=25μA/v. Also find A_I and A_V for the emitter follower.

8 Write short notes on the following
(a) Schottky Barrier diode.
(b) Light dependent resistor.

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Code: 9A04301 **3**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ELECTRONIC DEVICES AND CIRCUITS
(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE, & MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Discuss about temperature dependence of the V-I characteristics of a PN junction diode.
(b) For a diode calculate (i) The maximum allowable forward current I_f(max).
(ii) The forward diode resistance R_f when the maximum power rating of diode is 3.0watts and forward bias voltage of 1200mv.

2 (a) Explain the working of a bridge rectifier with a neat circuit diagram and with relevant wave forms.
(b) Ideal diodes are used in a bridge rectifier with a source of 230V, 50Hz. If the load resistance is 150Ω and turns ratio of transformer is 1:4, find the dc output voltage and pulse frequency of the output.

3 (a) With a neat diagram explain how a transistor acts as an amplifier. Give the DC load line analysis of a BJT.
(b) For a transistor calculate (i) β and (ii) α if the base current is 20μA and the collector current is 5mA.

4 (a) Discuss about stabilization in a transistor against variations in I_{CO}, V_{BE} and β.
(b) In a voltage divider bias circuit, V_{CC}=20 V and R_C=1.5 kΩ, the Q point is V_{CE}=8V and I_C=4mA. Stability factor S=12 and β=50. Find R_1, R_2 and R_E.

5 (a) Explain the working of an enhancement type MOSFET with a neat construction diagram and its characteristics.
(b) An n-channel enhancement type MOSFET has k=25mA/v^2 and $V_\gamma = 2v$. Determine drain-source resistance γ_{DS} for (i) V_{GS}=4V; (ii) V_{GS}=6V; (iii) V_{GS}=10V.

6 (a) Give the comparison between JFET and BJT.
(b) For a constant drain – to –source voltage, if the gate – to – source voltage is changed from 0 to 2V. The corresponding change in the drain current becomes 2mA. Calculate transconductance of the FET if the ac drain resistance is 200 kΩ. Also calculate the amplification factor of the FET.

7 (a) For common base amplifier derive A_I, A_V, R_I and R_O.
(b) For the emitter follower with R_S=1 kΩ and R_L=2 kΩ. Calculate A_I, R_i, A_V, A_{VS} and R_O. Assume h_{fe}=50, h_{ie}=1 kΩ, h_{oe}=25 μA/V.

8 Write short notes on the following
(a) Thermistor.
(b) Right emitting diode.

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Code: 9A04301 **4**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ELECTRONIC DEVICES AND CIRCUITS
(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE & MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Discuss about working of a zener diode using its V-I characteristics.
(b) The current flowing in a silicon PN junction diode at room temperature is 10μA, when the large reverse voltage is applied. Calculate the current flowing when 0.2v forward bias is applied.

2 (a) With a neat circuit diagram explain the working principle of a Zener voltage regulator.
(b) For a Zener shunt regulator if v_z=10v, R_S=1kΩ, R_L=10kΩ and the input voltage varies from 25 to 40 V. Find the maximum and minimum values of Zener current.

3 (a) Define α and β. Derive the relationship between α and β of the transistor.
(b) For a PNP transistor α=0.98 connected in CB configuration and reverse saturation current is 10μA. Calculate the base and collector currents for an emitter current of 5mA.

4 (a) Bring out the differences between Emitter feedback bias and collector to emitter feedback bias.
(b) In a self bias circuit V_{CC}=10v, R_C=2.5kΩ and the Q point is V_{CE}=5v and I_C=2mA. A stability factor of 10 is desired and β=60. Calculate R_1, R_2 and R_E.

5 (a) Give the analysis of a JFET small signal model. Derive the necessary equations.
(b) Determine drain to source resistance γ_{ds} of an m-channel depletion type MOSFET having I_{DSS}=10mA and V_P=-2v for V_{GS} values of (i) 3v and (ii) 4.5v.

6 (a) With a neat circuit diagram explain about fixed bias arrangement of a JFET.
(b) Calculate the dynamic resistance of a JFET having an amplification factor of 80 and transconductance of 400 μmho.

7 (a) For a common emitter amplifier derive the expressions for A_I, A_V, R_I and R_O.
(b) For the emitter follower with R_S=0.75 kΩ and R_L=3 kΩ. Calculate A_I, R_I, $A_V A_{VS}$ and Ro. Assume h_{fe}=50, h_{ie}=1 kΩ, h_{oe}=25 μA/v.

8 Write short notes on the following
(a) Tunnel diode.
(b) Silicon controlled rectifier.

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Code: 9A04306

1

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
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:
(i) $(AB)_{16}=(\ )_{10}$; (ii) $(1234)_8=(\ )_{10}$; (iii) $(10110011)_2=(\ )_{10}$; (iv) $(772)_{10}=(\ )_{16}$
(b) Perform the following using BCD arithmetic
(i) $(7129)_{10}$ +$(7711)_{10}$; (ii) $(8124)_{10}$ + $(8127)_{10}$

2 (a) Express the following functions in sum of minterms and product of max terms.
(i) $f(A,B,C,D)=\bar{B}D+\bar{A}D+BD$; (II) $F(x,y,z)=(xy+z)(xz+y)$
(b) Obtain the complement of the following Boolean expressions
(i) $(A\bar{B}+A\bar{C})(BC+B\bar{C})(ABC)$; (ii) $A\bar{B}C+\bar{A}BC+ABC$; (iii) $\overline{ABC}$ $\overline{(A+B+C)}$

3 (a) Show that $A\oplus B=(A+B)+(\bar{A}+\bar{B})$ and draw the circuit implementation using two-level NOR – NOR form and NAND – NAND form.
(b) Obtain the minimal Pos expression for the given Boolean function $f(A,B,C,D)=\sum 0,1,2,3,4,8,9,12$ and draw the circuits with two level NOR – NOR form and AND – OR form.

4 (a) Implement 64X1 multiplexer using four 16X1 and one 4X1 multiplexer. Draw block diagram only.
(b) A combinational logic circuit is defined by the following Boolean functions.
(i) $F_1=\overline{ABC}+AC$; $(ii)\ F_2=A\overline{BC}+\bar{A}B$; $(iii)\ F_3=\overline{AB}C+AB$. Design a circuit with a decoder and external gates.

5 (a) Draw the circuit diagram of clocked D-flip-flop with NAND gates and explain its operation using truth table give the timing diagram.
(b) Explain the procedure for the design of sequential circuits with an example.

6 (a) Design a 4-bit ring counter using T-flip-flops.
(b) With a neat diagram explain the operation of serial transfer between two shift registers. Draw its timing diagram.

7 (a) With a neat diagram explain about the construction of 4X4 RAM.
(b) Write in detail about sequential programmable devices.

8 (a) Give the implementation procedure for an SR latch using NOR gates.
(b) Discuss about reduction of state tables. Also explain about flow tables.

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Code: 9A04306 **2**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DIGITAL LOGIC DESIGN
(Computer Science & Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 Convert the following numbers to Hexadecimal
(a) $(765)_8$; (b) $(1002)_8$; (c) $(11001001)_2$; (d) $(875)_{10}$; (e) $(257)_{10}$;
(f) $(239)_{10}$; (g) $(343)_{10}$.

2 (a) Convert the following expressions into sum of products and product of sums:
(i) $(AB + C)(B + \bar{C}D)$; (ii) $\bar{x} + x(x + \bar{y})(y + \bar{z})$
(b) Obtain the Dual of the following Boolean expressions:
(i) $(A\bar{B} + A\bar{C})(BC + B\bar{C})(ABC)$; (ii) $A\bar{B}C + \bar{A}BC + ABC$; (iii) $A + \bar{B}C(A + B + \bar{C})$

3 (a) Implement the following Boolean function F using no more than two NOR gates and draw the circuit. $F(A, B, C, D) = \sum(0,1,2,9,11) + d(8,10,14,15)$
(b) Implement the Boolean function $F(A, B, C, D) = \pi(5,7,9,11,12,13,14,15)$ using
(i) NAND – AND form and (ii) AND – NOR form.

4 (a) Using K-map design a combinational logic circuit to obtain 2's complement for the given 4 – bit binary number. Draw the circuit using only two input exclusive – OR gates and 2-input OR gates.
(b) Design a combinational circuit to increment a 4 – bit binary number A_3, A_2, A_1, A_0 by 1using four half-address.

5 (a) Convert the following
(i) J-K flip-flop to T-flip-flop; (ii) RS flip=flop to D-flip-flop.
(b) Draw the circuit diagram of positive edge triggered JK flip-flop with NAND gates and explain its operation using truth table.

6 (a) Draw and explain about a 4-bit universal shift register.
(b) With a neat diagram explain about a ripple counter.

7 (a) Using a 32X8 ROM chips, construct a 128X8 ROM with the help of a relevant decoder.
(b) Distinguish between programmable logic arrays and programmable array logic.

8 (a) Explain about critical and non – critical races with the help of examples.
(b) Discuss about Hazards in sequential circuits.

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Code: 9A04306

3

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DIGITAL LOGIC DESIGN
(Computer Science & Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 Convert the following to binary and then to gray code
(a) $(1010)_{16}$; (b) $(AB33)_{16}$; (c) $(3323)_{8}$; (d) $(1764)_{8}$; (e) $(187)_{10}$; (f) $(2266)_{10}$

2 (a) Simplify the following Boolean functions
(i) $\bar{x}yz + \bar{x}y\bar{z} + x\bar{y}\bar{z} + x\bar{y}z.$ (ii) $\bar{x}yz + x\bar{y}\bar{z} + xyz + xy\bar{z}$.
(b) Obtain the complement of the following Boolean functions
(i) $\bar{A}\bar{C} + ABC + A\bar{C}$; (ii) $(\overline{\bar{x}\bar{y} + z}) + z + xy = wz$

3 (a) Implement $F = (\bar{x}y + x\bar{y})(w + \bar{z})$ using multilevel NOR gates and draw the circuit.
(b) Implement the following Boolean functions using wired - logic.
(i) $F_1 = \overline{AB}.\overline{CD}$ Use AOI gate. (ii) (i) $F_2 = \overline{A + B}.\overline{C + D}$ Use AOI gate.

4 (a) A combinational logic circuit is defined by the following Boolean functions
(i) $F_1 = \overline{ABC} + AC$; (ii) $F_2 = A\overline{BC} + \bar{A}B$; (iii) $F_3 = \overline{AB}C + AB$ Design a circuit with a decoder and external gates.
(b) Using a K – map design a combinational circuit to obtain 2's complement for the given 4 – bit binary number. Draw the circuit using only two input EX-OR gates and 2 – input OR gates.

5 Obtain state table and state diagram for sequence recognizer to recognize the occurrence of the sequence bits 1101, and design the logic circuit.

6 (a) Briefly discuss about different types of counters.
(b) With a neat diagram explain about a 4 bit universal shift register.

7 (a) With necessary diagrams, distinguish between Random Access and Read only memories.
(b) Explain about memory decoding.

8 (a) Explain about fundamental and pulse mode asynchronous sequential circuits.
(b) Classify and explain about Hazards.

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Code: 9A04306 **4**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DIGITAL LOGIC DESIGN
(Computer Science & Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 Perform subtraction with the following unsigned decimal numbers by taking 10's complement of the subtrahend. Verify the result.
(i) 5250 – 1321; (ii) 1753 – 8640; (c) 20 – 100; (d) 1200 – 250.

2 (a) Simplify the following Boolean functions.
(i) $\bar{x}z + \bar{x}y + x\bar{y}z + yz$; (ii) $\bar{x}\bar{y}\bar{z} + \bar{x}y\bar{z} + x\bar{y}\bar{z} + x\bar{y}z + xy\bar{z}$
(b) Obtain the complement of the following Boolean expressions
(i) $\bar{A}B(\bar{D} + \bar{C}D) + B(A + \bar{A}CD)$; (ii) $(\bar{A} + C)(\bar{A} + \bar{C})(A + B + \bar{C}D)$

3 (a) If $F_1(A, B, C) = A \oplus B \oplus C$ and $F_2(A, B, C) = A \oplus C \oplus B$ show that F_1=F_2.
(b) Obtain minimal sop expression for the complement of the given expression: $F(A, B, C) = \pi(1,2,5,7)$ and draw the circuit using NOR gates.

4 (a) Design a combinational circuit to increment a 4 – bit binary number A_3, A_2, A_1, A_0 by using four half – adders.
(b) Implement 64X1 multiplexer using four 16X1 and one 4X1 multiplexer. Draw block diagram only.

5 (a) Explain the procedure for the design of sequential circuits with an example.
(b) Convert the following
(i) JK flip – flop to T – flip – flop; (ii) RS flip – flop to D flip – flop.

6 (a) Discuss about different types of shift Registers.
(b) Discuss in detail about synchronous counters.

7 (a) Discuss about error detection and correction methods used in memory devices.
(b) Explain about sequential programmable devices.

8 (a) Discuss about races in Asynchronous sequential circuits.
(b) Differentiate static – 0 and static – 1 hazard with wave forms and explain how static hazards are eliminated in an asynchronous circuit.

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Code: 9A05301 **1**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to Computer Science & Systems Engg, Information Technology and Computer Science & Engg)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Explain the law of duality.
(b) Explain the terms of equivalence.

2 Show that r ^ (p v q) is a valid conclusion
Form premises p v q , q → r , p → m and ~m.

3 (a) Let A = {1, 2, 3, 4, 5, 6, 7}. Determine a relation R on A by aRb 3 divides (a - b), show that R is an equivalence relation. Also determine the partition generated by R.
(b) Let A = { 1,2,3,4 } and let R = {(1,1) , (1,2), (2,1), (2,2), (3,4), (4,3), (3,3), (4,4)} be an equivalence relation on R . Determine A/R.

4 (a) G is a group and there exist two relatively prime positive integers m and n such that $a^m b^m = b^m a^m$ and $a^n b^n = b^n a^n$ for all a,b, ϵ G prove that G is abelian.
(b) Find the order of every element in the multiplicative group G = { $a,a^2,a^3,a^4,a^5,a^6 = e$}

5 Find the coefficient of X^{16} in $(1+X^4+X^8)^{10}$

6 (a) In how many ways can a committee of 5 teachers and 4 students be chosen from 9 teachers and 15 students?
(b) There are 25 true or false questions on an examination. How many different ways can a student do the examination if he or she can also choose to leave the answer blank?

7 (a) Prove that a graph is connected if and only if it has spanning tree?
(b) Define spanning tree?

8 (a) Define isomorphism problem?
(b) Prove that two graphs are isomorphic iff their corresponding adjacency matrices are equal?

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Code: 9A05301 **2**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to Computer Science & Systems Engg, Information Technology and Computer Science & Engg)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Show that the truth value of the formula ((P → Q) ^ (Q → R))→ (P → R) are independent of their propositional variables.
(b) Give the converse and contra positive of the proposition P → (Q ^ R).

2 (a) Show that R → s can be derived from the Premises (P → (Q → S)), ~ R v P and Q .
(b) Explain the predicates with suitable examples.

3 (a) What is a relation? Explain the properties of relations?
(b) What are the operations on relations?

4 (a) Let (S, *) be a semi group and a, b ϵ S. If a*b = b and b*a = a. show that a, b, a*b and b*a are idempotent.
(b) Prove that the identity element of a sub-group is the same as that of the group.

5 (a) Find a generating function for the number of r-combinations of {3.a,5.b,2.c}
(b) Solve the recurrence relation using generating function. a_n-$9a_{n-1}$+$20a_{n-2}$=0, for n≥2 and a_0= -3 and a_1= -10

6 (a) How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8 and 9 if no repetitions are allowed?
(b) How many 8 digit numbers can be formed by arranging the digits 1,1,1,1, 2, 3, 3, 3, 3?

7 Explain different graph traversals with an example?

8 (a) Explain Konigsberg problem in graph theory?
(b) Explain Chinese Postman Problem in graph theory?
(c) Describe Euler walk?

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Code: 9A05301 **3**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to Computer Science & Systems Engg, Information Technology and Computer Science & Engg)

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 (a) Verify the proposition (p ^ q) and (p v q) is a contradiction.
(b) Symbolize the following statements
(i) X is the father of the mother of y. (ii) All rational numbers are real numbers.

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

4 (a) Explain about Homomorphism?
(b) Prove that "Let θ: G→G' be a homomorphism. Then θ is one – one ⇔ K = ker θ = {e}

5 (a) In how many ways can a person climb up a flight of n steps if the person can skip at most one step at a time?
(b) Solve the recurrence relation $a_n-7a_{n-1}+12a_{n-2}=3^n$, for n>=2

6 (a) How many ways can we get a sum of 8 when two indistinguishable dice are rolled?
(b) What is the coefficient of x^3y^7 in $(x+y)^{10}$?

7 (a) Prove that $K_{3,3}$ is non-planar?
(b) Construct the spanning tree of K_3 using the traversal algorithm that needs backtracking?

8 (a) Show that every simple graph has two vertices of the same degree?
(b) Prove that a complete graph with n vertices contains n (n - 1)/2 edges?

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Code: 9A05301 **4**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to Computer Science & Systems Engg, Information Technology and Computer Science & Engg)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Define tautology, contradiction, contingency with examples.
(b) What are statements? How are they denoted?

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) What is a function? State the types of functions.
(b) What is an inverse function? Explain with an example.
(c) If b : A → B and g : B → C are bijective functions then $(g \circ f)^{-1} = f^{-1}og^{-1}$

4 (a) Prove that the group $< Z_4, +>$ is cyclic find all its generators?
(b) Prove that "Every cyclic is abelian, but the converse is not true".

5 (a) Solve the recurrence relation $a_n^2 - 2a_{n-1}^2 = 1$ for $n \geq 1$ and $a_0 = 2$.
(b) Describe the compound interest problem using recurrence relation?

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) For any simple graph G, prove that the number of edges of G is less than or equal to n(n-1)/2, where n is the number of vertices in a graph.?
(b) Define spanning tree and planar graph?

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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