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R-11 / R-13

Code: 1G131

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2017

Advanced Data Structures Through C++

(Common to CSE & IT)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks each**)

- 1. a) How the member functions can be defined? Explain. 6M
b) What is friend function? What are the merits and demerits of using friend function? 8M

- 2. a) Explain the concept of function overloading and operator overloading with an example. 7M
b) Explain Base Class and Derived Class with Example. 7M

- 3. a) Define Abstract Data Type? Explain the implementation of stack ADT in details. 7M
b) How we can measure the performance of an algorithm? Discuss in detail. 7M

- 4. Explain about linear probing and quadratic probing techniques used in hashing. 14M

- 5. a) Define and explain in detail about Priority Queue ADT. 4M
b) Explain about external sorting and Multi way merge. 10M

- 6. Write and trace the algorithm to construct binary search tree for the values: 5, 4, 2, 1, 3, 6, 8, 7. Also write the algorithm to search for a given element and trace it for the values 8 and 10. 14M

- 7. Write notes on the following:
a) Splay trees. 7M
b) Red-black trees. 7M

- 8. a) Write and explain the Knuth-Morris-Pratt algorithm with suitable algorithm. 7M
b) Write and explain Brute force algorithm. 7M

Code: 1G235

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2017

Basic Electrical Engineering

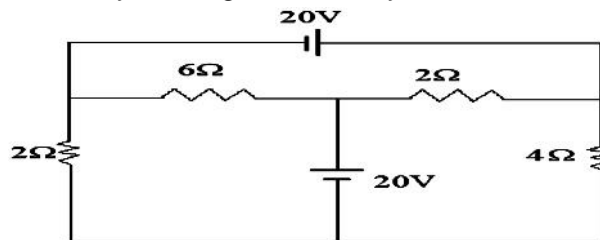
(Common to CSE & IT)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll Questions carry equal marks (**14 Marks each**)

1. a) Derive and explain the basic circuit components 7M
- b) Three resistances 1.5Ω , 3Ω and 3.5Ω are connected in parallel and the combination is connected in series with a resistance of 1.95Ω . Find the equivalent resistance of the circuit. What current will it draw if it is connected to a 30V supply 7M
2. a) State and explain Thevenin's theorem. With an example 7M
- b) Find the voltage across 4Ω resistor in the circuit shown using Superposition theorem and also verify it using mesh analysis.



3. a) Define and explain the following terms related to an alternating quantity:
 (i) Instantaneous value (ii) Time period (iii) Frequency (iv) Amplitude
 (v) Cycle (vi) Angle of frequency 6M
- b) A 50Hz sinusoidal current has peak factor 1.4 and form factor 1.1. Its average value is 20A. The instantaneous value of current is 15 A at $t=0$ sec. Write the equation of current and draw its wave form 8M
4. a) Write the advantages and disadvantages of 3-phase circuits over 1-phase circuits. 7M
- b) Three impedances $(3+j4) \Omega$, $(5+j0) \Omega$ and $(2-j2) \Omega$ are connected in delta to a 100V, 3-phase, and 50Hz balanced supply. Calculate the line currents and total power consumed 7M
5. a) Explain the principle of operation of a dc generator with neat sketches and Fleming's right rule 7M
- b) Explain the Swinburne's test on D.C shunt motors with suitable diagram 7M
6. a) Define voltage regulation of a transformer. Deduce the expression for the voltage regulation 7M
- b) A 200 / 400V, 50Hz 1 phase transformer on test gave following readings:
 O.C (l.v): 200V, 0.7A, 70W,
 S.C (h.v): 15V, 10A, 80W. Find voltage regulation at 0.8 p.f lagging at full load. 7M
7. a) Explain rotating magnetic field produced in a three phase induction motor with relevant phasor diagrams 7M
- b) A 3 phase, 50Hz induction motor has a starting torque which is 1.25 times full load torque and a maximum torque which is 2.5 times full load torque. Neglecting stator resistance and rotational losses and assuming rotor resistance, find (a) Slip at full load (b) Slip at maximum torque 7M
8. a) Explain with neat sketch the construction and working of a MI voltmeter 7M
- b) Write short notes about digital multimeters 7M

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II B.Tech. I Semester Supplementary Examinations Nov/Dec 2017

Digital Logic Design

(Computer Science & Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks each**)

- 1 Convert the following into decimal and binary
a) 4021.2_5
b) 634_8
c) 1032.2_4
d) $ABCD_{16}$
e) 1001001.011_2 14M
2. a) Express the Boolean function $F = XY + XZ^1$ in a product of maxterm form 6M
b) Simplify the Boolean functions to a minimum number of literals
i. $(X+Y)(X+Y^1)$
ii. $XYZ + X^1Y + XYZ^1$
iii. $ZX + ZX^1Y$
iv. $(A+B)^1 (A^1+B^1)^1$ 8M
3. a) Draw NOR logic diagram that implements the following
 $F(w,x,y,z) = (0,2,8,3,7,11,13,14)$ 7M
b) Determine the Canonical sum of products and product of sums for
 $A^1B + ABC + C^1 + B^1$ 7M
4. a) Design and draw a full subtractor which will use two half subtractors 7M
b) Design and Implement half adder using 4 NAND gates 7M
5. a) Design a modulo 12 synchronous counter using T-FF and draw the circuit diagram 8M
b) Write short notes on shift registers 6M
6. A sequential circuit has two flip-flops (A and B), two inputs (x and y), and an output (z). The flip-flop input functions and the circuit output functions are as follows:
 $JA = xB + y^1B^1$ $KA = xy^1B^1$
 $JB = xA^1$ $KB = xy^1 + A$
 $z = xyA + x^1y^1B$
Obtain the logic diagram ,state table ,state diagram and state equations 14M
7. a) What are the steps for the design of asynchronous sequential circuit? 4M
b) Explain circuits with latches 10M
8. a) Discuss about programmable logic array and programmable array logic 14M

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Code: 1G334

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2017

Electronic Devices and Circuits

(Common to CSE & IT)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll Questions carry equal marks (**14 Marks each**)

1. a) Derive the expression for diode current equation 8M
 b) Distinguish between zener and avalanche breakdown mechanism 6M

2. a) Explain the working of full wave rectifier with neat diagram and with relevant wave forms. 7M
 b) Explain FWR with C-filter and derive the expression for ripple factor. 7M

3. a) Explain the operation of a BJT in CE configuration. Give its input-output characteristics. Define β_{DC} . 10M
 b) For a PNP transistor $\beta_{DC} = 0.98$ connected in CB configuration and reverse saturation current is $10\mu A$. Calculate base and collector current for emitter current of $5mA$. 4M

4. a) Draw the transistor biasing circuit using fixed bias arrangement and explain its principle with suitable analysis. 7M
 b) Define Thermal runaway? Derive the condition to avoid Thermal runaway. 7M

5. a) With a neat construction diagram explain the principle of operation of a N-channel JFET. Give its characteristics. 7M
 b) Explain the principle of operation of N-channel Depletion MOSFET with neat sketch and draw its characteristic. 7M

6. a) Draw the h-parameter equivalent circuit for a typical CE amplifier and derive the expression for A_i , R_i , A_v and R_o . 7M
 b) Define class-B amplifier? Derive the expression for conversion efficiency. 7M

7. a) Explain concept of feedback with block diagram. 6M
 b) Draw the circuit diagram of voltage- series feedback amplifier and derive the expression for input and output resistance. 8M

8. a) Show that the gain of wien bridge oscillator using BJT amplifier must be at least 3 for the oscillation to occur. 8M
 b) A crystal $L = 0.4H$, $C = 0.085pF$ and $C_M = 1pF$ with $R = 5K$. Find
 i) Series resonant frequency
 ii) Parallel resonant frequency
 iii) Find Q factor of the crystal 6M

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II B.Tech. I Semester Supplementary Examinations Nov/Dec 2017

Mathematical Foundations of Computer Science

(Common to CSE&IT)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions
 All Questions carry equal marks (**14 Marks each**)

1. a) Show that $\sim (p \vee (\sim p \wedge q))$ and $\sim p \wedge \sim q$ are logically equivalent . 7M
 b) Check whether the following are well formed formulae or not.
 (i) $\sim (p \wedge q)$. (ii). $\sim p \vee q$. 7M

2. a) How the validity of an argument can be checked by using truth table? Give an example. 7M
 b) Show that $r \vee s$ follows logically from premises:
 $c \vee d$, $(c \vee d) \rightarrow \sim b$, $\sim b \rightarrow (a \wedge \sim b)$ and $(a \wedge \sim b) \rightarrow r \vee s$. 7M

3. a) What is a function? State the types of functions. 7M
 b) What is an inverse function? Explain with an example. 7M

4. Prove that “Every cyclic is abelian, but the converse is not true”. 14M

5. Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 7 \cdot 3^n + 4^n$ 14M

6. a) How many three digit numbers are there which are even and have no repeated digits? 7M
 b) Find the number of arrangement of the letters of MISSISSIPPI. 7M

7. a) Find the chromatic number of a graph with only n- isolated vertices 7M
 b) Let G be graph with 11 or more vertices. Show that G is non-planar. 7M

8. a) Give an example of a regular, connected graph of 6 vertices, which is not complete. 7M
 b) Prove that C is the only cycle graph isomorphic to its complement. 7M

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R-11 / R-13

Code: 1GC33

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2017

Probability and Statistics

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions
 All Questions carry equal marks (**14 Marks each**)

1 a) Find the coefficient of correlation between X and Y

X	1	2	3	4	5	6	7	8	9
Y	12	11	13	15	14	17	16	19	18

7M

b) Calculate expectation and variation of X, if the probability distribution of the random variable X is given by

X	-1	0	1	2	3
f	0.3	0.1	0.1	0.3	0.2

7M

2. a) The chance that doctor A will diagnose a disease x correctly is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of doctor A, who had disease x, died. What is the chance that his disease was diagnosed correctly?

7M

b) Box A contains 5 red and 3 white marbles and box B contains 2 red and 6 white marbles. If a marble is drawn from each box, what is the probability that they are both of same colour.

7M

3. a) Calculate expectation and variance of X, if the probability distribution of the random variable X is given by

X	-1	0	1	2	3
F	0.3	0.1	0.1	0.3	0.2

7M

b) Let X denote the number of heads in a single toss of 4 fair coins. Determine (i) $P(X < 2)$ (ii) $P(1 < X \leq 3)$

7M

4. a) The mean and Variance of a binomial distribution are 4 and $\frac{4}{3}$ respectively.

Find $P(X \geq 1)$

7M

b) In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find

- (i) How many students score between 12 and 15?
- (ii) How many score above 18?
- (iii) How many score below 18?

7M

5. If the population is 3,6,9,15,27

- i. List all possible samples of size 3 that can be taken without replacement from the finite population.
- ii. Calculate the mean of each of the sampling distribution of means.
- iii. Find the standard deviation of sampling distribution of means.

14M

6. a) In a study of an automobile insurance a random sample of 80 body repair costs had a mean of Rs. 472.36 and the S.D of Rs. 62.35. If \bar{x} is used as point estimate to the true average repair costs, with what confidence we can assert that the maximum error doesn't exceed Rs 10. 7M
- b) A random sample of 400 items is found to have mean 82 and standard deviation of 18. Find the maximum error of estimation at 95% confidence interval. Find the confidence limits for the mean if $\bar{x} = 82$. 7M
7. a) If the distribution of the weights of all men travelling by air between Delhi and Mumbai has a mean of 163 pounds and a standard deviation of 18 pounds. What is the probability that the consigned gross weight of 36 men travelling between these two cities is more than 6000 pounds? 7M
- b) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with S.D. of 423 hours. A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with S.D. of 398 hours. Is there a significant difference between the means of two batches? 7M
8. a) The following figures show the distribution of digits in numbers chosen at random from a telephone directory.

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	1026	1107	997	966	1075	933	1107	972	964	853

Test whether the digits may be taken to occur equally frequently in the directory. 7M

- b) A random sample of 400 men and 200 women in a locality were asked whether they would like to have a bus stop near their residence. 200 men and 400 women in favour of the proposal. Test the significance between the differences of two proportions at 5% level. 7M
