F 3127 (Pages : 2) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

## Third Semester

Common to all Branches

EN 010 302—ECONOMICS AND COMMUNICATION SKILLS (AI, AN, AU, CE, CH, CS, EC, EE, EI, IC, IT, ME, MT, PE, PO, ST)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

## Part A

*Answer* **all** *questions briefly.*
*Each question carries* 3 *marks.*

1. What are the objectives of credit control ?
2. What is WTO ? What are its objectives ?
3. State the merits of indirect taxes.
4. List the different types of inflation.
5. Distinguish between free trade and protection.

(5 × 3 = 15 marks)

## Part B

*Answer* **all** *questions.*
*Each question carries* 5 *marks.*

6. What is meant by credit creation ? What are the tendencies behind credit creation ?
7. Render your comments on the disinvestment of public sector undertakings.
8. What are the differences between a tax on income and tax on a commodity ? Why is a tax on income preferred in modern times ?
9. What are the major methods of measuring national income ? Explain.
10. State and explain the various items included in the balance of payments of a country.

(5 × 5 = 25 marks)

Turn over

## Part C

*Answer* **all** *questions.*
*Each full question carries* 12 *marks.*

11. What are the main functions of banks ? Explain the role played by Commercial banks in the economic development of a country.

*Or*

12. "Stock market can be regarded as an economic barometer." Critically examine this statement in the context of Indian economy.

13. What are the measures taken by Indian Government in the case of Globalisation, Liberalisation and Privatisation. Explain their impacts on Indian economy.

*Or*

14. Discuss the past, present and future prospects of Information Technology industries on Indian economy.

15. (a) Distinguish between Forward and Backward shifting of tax. Explain the impact and incidence of tax. (7 marks)

(b) Explain progressive, proportional and regressive taxes with suitable examples. (5 marks)

*Or*

16. (a) Explain the important problems associated with deficit financing in Indian Economy. (7 marks)

(b) Define tax evasion. Explain the reasons for the same in India. (5 marks)

17. (a) Define National Income. What are its concepts ? Explain the difficulties arising in the calculation of National Income. (7 marks)

(b) Explain the significance of national income statistics. (5 marks)

*Or*

18. Describe the different types of inflation and their causes. What are the steps taken by the Government to control the same ? Explain.

19. What are the different types of disequilibrium in BOP ? Explain the causes for and the methods of correcting disequilibrium in BOP.

*Or*

20. What are the main causes of India's adverse balance of payments ? Explain the measures that have been adopted to correct the adverse balance of payments. Critically examine India's trade policy.

[5 × 12 = 60 marks]

**F 3132** (Pages : 2) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

## Third Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 303/IT 010 306—PROBLEM SOLVING AND COMPUTER PROGRAMMING (CS, IT)

(New Scheme—2010 admission onwards)

[Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

*Write neat and efficient C programs wherever necessary.*

## Part A

*Answer* **all** *questions briefly.*
*Each question carries* 3 *marks.*

1. How can the getchar function be used to read mutlicharacter strings ?
2. List any three unconditional control statements in C ?
3. How function declaration is different from a function definition ?
4. How is a multidimensional array defined in terms of a pointer to a collection of contiguous arrays of lower dimensionality ?
5. What is the purpose and scope of an automatic variable ?

(5 × 3 = 15 marks)

## Part B

*Answer* **all** *questions.*
*Each question carries* 5 *marks.*

6. What is the output of the following program ?

```
main ( )
{ int x = 5 ;
  while (x = = 1)
      x = x – 1 ;
printf ("% d\n", x) ; }
```

7. Write a C program to find the sum of numbers between 1 and $n$.
8. Explain the rules to call a function, giving appropriate examples.

**Turn over**

9. Give an example of a C structure and explain how members of the structure are accessed in a C program ?

10. Explain the use of ftell ( ), fseek and fgetc ( ) functions in files.

(5 × 5 = 25 marks)

## Part C

*Answer* **all** *questions.*
*Each full question carries* 12 *marks.*

11. Explain the different types of operators and expressions in C. Demonstrate each one with a suitable example.

*Or*

12. With appropriate examples, explain the use of algorithm, flow-chart and pseudocodes in program development.

13. Write a C program to calculate and print the arithmetic mean, variance and standard deviation of $n$ values.

*Or*

14. Write a C program to read the given $n$ numbers. Find the sum of all positive and negative numbers. Find out which sum is larger in magnitude. Also print the difference in the magnitude of the two sums.

15. Write a C program to read a string and copy only the alphabets into another string. For example, "NEW DELHI-110011C" is to be copied as "NEW DELHI C".

*Or*

16. What is macro ? What are its advantages ? Write a program using macro, to find the area and perimeter of a triangle when its three sides are given.

17. Define a structure to represent time in hours (0 – 23), minutes (0 – 59), and seconds (0 – 59), and then write a function that accepts as an argument a time represented by this structure and updates it by 1 second.

*Or*

18. Write a function using pointers to add two matrices and to return the resultant matrix to the calling function.

19. Write a C program to read a data file containing integers. Find the largest and smallest integers and display them.

*Or*

20. A student master file consists of name, register member, marks, grade of 500 students in five subjects. Write a C program which reads the file and print a list of students who failed (secured 'E' grades) in one or more subjects.

(5 × 12 = 60 marks)

F 3162 (Pages : 2) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

## Third Semester

Branch : Information Technology

IT 010 305—PRINCIPLES OF COMMUNICATION ENGINEERING (IT)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

## Part A

*Answer* **all** *questions.*
*Each question carries* 3 *marks.*

1. What is modulation ?
2. Give the applications of VSB modulation.
3. What is a discriminator ?
4. What is noise figure ? What is its significance ?
5. What are the advantages of PCM ?

(5 × 3 = 15 marks)

## Part B

*Answer* **all** *questions.*
*Each question carries* 5 *marks.*

6. Discuss the bandwidth requirements of various modulation schemes.
7. A transmitter radiates 1200 W of power under carrier conditions. If this carrier is modulated simultaneously by two tones of 20 % and 40 % respectively, determine the total power radiated.
8. Obtain the frequency spectrum of an FM wave.
9. The noise figure of an IF amplifier is 15 dbs. The amplifier is preceded by a pre-amplifier with a gain of 10 dbs and noise figure of 6 dbs. Find the overall noise figure.
10. Explain, how PAM signals are generated.

(5 × 5 = 25 marks)

**Turn over**

## Part C

*Answer* **all** *questions.*

*Each question carries* 12 *marks.*

11. Explain with diagrams the principle of Satellite Communication System.

*Or*

12. Draw the block diagram of a superheterodyne receiver. Explain the functions of each block.

13. Explain with a circuit diagram the principle of generation of SSB waveform.

*Or*

14. Draw and explain the circuit diagram of a DSB-SC modulator.

15. Explain with diagram the principle of operation of an FM receiver.

*Or*

16. Draw and explain the circuit diagram of a phase modulator. What are the advantages of the selected circuit ?

[illegible] of noise in communication systems.

18. What is AGC ? Explain with a circuit diagram its principle of operation.

19. Explain with circuit diagrams the generation and reconstruction of PCM signals.

*Or*

20. Compare the characteristics of different pulse modulation systems.

(5 × 12 = 60 marks)

F 3181 (Pages : 2) Reg. No.....

Name.....

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# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

**Fifth Semester**

Branch : Computer Science and Engineering/Information Technology

DATABASE MANAGEMENT SYSTEMS (R,T)

(Old Scheme – Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

## Part A

*Answer* **all** *questions.*

*Each question carries* 4 *marks.*

1. Describe the three-schema architecture.
2. Explain the concept of physical data independence, and its importance in database systems.
3. What is union compatibility ? Why do the UNION, INTERSECTION, and DIFFERENCE operations require that the relations on which they are applied be union compatible ?
4. Describe the four clauses in the syntax of a simple SQL retrieval query. Show what type of constructs can be specified in each of the clauses. Which are required and which are optional ?
5. Draw a state diagram and discuss the typical states that a transaction goes through during execution.
6. What is a cascadeless schedule ? Why is cascadelessness of schedules desirable ?
7. Explain the distinctions among the terms primary key, candidate key, and superkey.
8. Use Amstrongs axioms to prove the soundness of the pseudotransitivity rule.
9. Why is data replication useful in DDBMSs ? What typical units of data are replicated ?
10. When are voting and elections used in distributed databases ?

(10 × 4 = 40 marks)

## Part B

*Answer* **all** *questions.*

*Each full question carries* 12 *marks.*

11. (a) Draw an ER diagram for a Library Management Database. Assume suitable entities ? Be sure to indicate various attributes of each entity and relationship set ; also specify key and participation constraints for each relationship set.

*Or*

**Turn over**

(b) Draw an ER diagram for a Hospital Management Database. Assume suitable entities? Be sure to indicate various attributes of each entity and relationship set ; also specify key and participation constraints for each relationship set.

12. (a) What is meant by relational algebra? With suitable example define all the variations of join operations. Represent the same in relational algebra.

*Or*

(b) What are nested queries? What is correlation in nested queries? How would you use the operators IN, EXISTS, UNIQUE, ANY, and ALL in writing nested queries? Why are they useful? Illustrate your answer with suitable example.

13. (a) How does a query tree represent a relational algebra expression? What is meant by an execution of a query tree? Discuss the rules for transformation of query trees and identify when each rule should be applied during optimization.

*Or*

(b) What is a timestamp? How does the system generate timestamps? Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering?

14. (a) (i) Define fourth normal form. When is it violated? When is it typically applicable?

(ii) Define join dependency and fifth normal form. Why is 5NF also called project-join normal form (PJNF)?

*Or*

(b) Explain the concept of normalization. Consider the universal relation R = A, B, C, D, E, F, G, H, I, J and the set of functional dependencies F = AB $\rightarrow$ C, BD $\rightarrow$ EF, AD $\rightarrow$ GH, A $\rightarrow$ I, H $\rightarrow$ J. What is the key for R? Decompose R into 2NF and then 3NF relations.

15. (a) Discuss the architecture of a DDBMS. What are the main software modules of a DDBMS? Discuss the main functions of each of these modules in the context of the client-server architecture.

*Or*

(b) Discuss about different approaches to concurrency control in DDBMS.

(5 × 12 = 60 marks)

F 3105 (Pages : 2) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

## Third Semester

Branch—Computer Science and Engineering/Information Technology

PROBLEM SOLVING AND COMPUTER PROGRAMMING (R, T)

(Prior to 2010 Admissions—Old Scheme)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

*Write neat and efficient C programs whenever necessary.*

## Part A

*Answer* **all** *questions briefly.*
*Each question carries* 4 *marks.*

1. Differentiate between structured and object oriented programming.
2. What are the steps involved in computer programming ? Explain.
3. Describe the basic data types and specify the size and range.
4. Write notes on variables, expressions and assignments used in C with suitable examples.
5. What is a function ? With an example, give the general syntax of a function.
6. Explain the syntax of "switch" statement. Give an example.
7. State any *four* differences between arrays and structures.
8. Why array is called a derived data type ?
9. What is pointer ? How do you access a variable through a pointer ?
10. Under what conditions can one pointer variable be compared ? Under what conditions are such comparisons useful.

(10 × 4 = 40 marks)

## Part B

*Answer* **all** *questions.*
*Each full question carries* 12 *marks.*

11. Write an algorithm and draw the flow chart to exchange the values of variables $x$ and $y$.

*Or*

12. Write the algorithm and give the flow chart to find whether a given number is prime or not.

**Turn over**

13. Using formatted I/O, write a C program to print all the odd numbers upto 99 in separate lines.

*Or*

14. With necessary examples, describe any three input and any three output formats used in C ?

15. Write a C program to write all prime numbers upto a number, which is to be received by the program from keyboard.

*Or*

16. Write a function in C to find the 9's complement of an integer and 10's complement of an integer. Write a main program, which accepts an integer and calling the function, prints out the 9's complement, if the number input is positive integer or the 10's complement if it is a negative integer.

17. Write a C program using structures to multiply two complex numbers. Write the programs as a function to be called from a main program.

*Or*

18. Write a structure in C to store an employee's hourly wages along with other data. Write a program to create an array of such employee details and then to compute and print the total salary expenditure, if the hours worked by each employee is also stored in the structure.

19. Write a function that accepts characters into a string by using a pointer. Compute the length of the array using a pointer, given that the string is terminated by a null character. Finally print the string in reverse order using a pointer.

*Or*

20. Write a C program that compares two files and returns '0' if they are equal and '1' if they are not. file names are passed as command line arguments.

(5 × 12 = 60 marks)

F 3113 (Pages : 2) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

**Third Semester**

Branch—Computer Science and Engineering/Information Technology

HUMANITIES (R, T)

(Prior to 2010 Admissions—Old Scheme)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

*Answer Part A and Part B in* **separate** *answer books.*
*Part A and Part B carry 50 marks each.*
*All full questions carry equal marks.*

## Part A (Principles of Management)

*Answer any* **one** *full question from each module.*

MODULE 1

1. (a) Explain the following functions of management :—

(i) planning ; (ii) directing ; and

(iii) staffing.

*Or*

(b) Explain the following :—

(i) functional organisation ;

(ii) matrix organisation ; and

(iii) Committee organisation.

Give their merits and demerits.

MODULE 2

2. (a) Explain clearly the tools and techniques used in total quality management.

*Or*

(b) What is the necessity of ISO 9000 certification ? Explain the main features of ISO 9000 certification process.

(50 marks)

**Turn over**

## Part B (Engineering Economics)

*Answer any* **one** *full question from each module.*

MODULE 3

3 (a) (i) Describe the quantitative controls which the RBI adopts to regulate money supply.

(ii) How does RBI control credit ?

*Or*

(b) (i) Explain how the commercial banks reconcile the conflicting aims of liquidity and profitability in their operations.

(ii) Examine the case for and against the use of the method of variable reserve ratios for the control of bank credit.

MODULE 4

4. (a) (i) Discuss the important features of new industrial policy of the Government of India.

(ii) Distinguish between large scale and small scale industries, bringing out their significances.

*Or*

(b) Critically examine the industrial growth in India since independence. Suggest your views for future development.

MODULE 5

5. (a) (i) Explain the social and economic objectives of taxation.

(ii) Bring out the money burden and real burden of public debt both internal and external.

*Or*

(b) (i) What is black money ? What are its consequences ? How it can be controlled ?

(ii) Discuss the major purposes for which public debt is incurred.

(50 marks)

F 3126 (Pages : 3) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

## Third Semester

**Branch : Computer Science and Engineering / Information Technology**

**EN 010 301 B—ENGINEERING MATHEMATICS—II (CS, IT)**

**[New Scheme—2010 Admission onwards]**

**(Regular/Improvement/Supplementary)**

**Time : Three Hours** **Maximum : 100 Marks**

## Part A

*Answer* **all** *question briefly.*
*Each question carries* 3 *marks.*

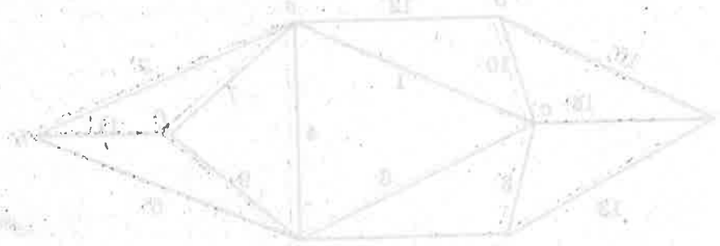
1. Determine whether the following statements are true *or* false ? Briefly explain your answer :
   (a) $\{\phi\} \subseteq \{\phi\}$.
   (b) $\{\phi\} \subseteq \phi$.
   (c) $\{a, \phi\} \subseteq \{a, \{a, \phi\}\}$.
2. Explain one-to-one and onto functions.
3. Explain the method to construct Hasse diagram.
4. What is homomorphism ? Explain.
5. What is meant by a spanning tree for a connected graph.

(5 × 3 = 15 marks)

## Part B

*Answer* **all** *questions.*
*Each carries* 5 *marks.*

6. Prove that there is no rational number $p/q$ whose square is 2.
7. Suppose A = {2, 3, 6, 8, 9, 18} is ordered by divisibility Identify the non-comparable pairs of elements of A.



**Turn over**

8. Let $S = \{1, 2, 3, 4, 5\}$ has a partition consisting of the sets $\{1, 3, 5\}$ and $\{2, 4\}$. Show that this partition determines an equivalence relation.

9. Find all sub-lattices of $\langle S_n, D \rangle$ for $n = 12$.

10. If G be a simple graph with $n$ vertices, where $n \geq 2$. Prove that G has two vertices $u$ and $v$ with $d(u) = d(v)$.

(5 × 5 = 25 marks)

## Part C

*Answer* **all** *questions.*
*Each full question carries* 12 *marks.*

11. (a) Show that $(x)(P(x) \vee Q(x)) \Rightarrow (x)P(x) \vee (\exists x)Q(x)$.

(b) Show that $(\exists x)(F(x) \wedge S(x)) \rightarrow (y)(M(y) \rightarrow W(y))$ if $(x)(F(x) \rightarrow \neg S(x))$ follows.

*Or*

12. (a) Define the terms : proposition, primitive, conjunction, disjunction and negation. Also construct the truth table of $\neg(p \wedge \neg q)$.

(b) Define the terms tantology and contradiction. Show that $\neg p$ and $\neg(p \vee q) \vee (\neg p \wedge q)$ are logically equivalent.

13. (a) If $A = \{1, 2, ...., n\}$, show that any function from A to A which is one-to-one must also be into, and conversely.

(b) Using Euclidean algorithm, find *gcd* 12378 and 3054.

*Or*

14. (a) If $a \equiv b \pmod{m}$ then show that $a^k \equiv b^k \mod (m)$ for every positive integer values of $k$.

(b) Using pigeonhole principle, show that if any 5 numbers from 1 to 8 are chosen, then two of them will add upto 9.



15. (a) Define partially ordered relation. Explain :

(b) Let R be a reflexive relation on a set A. Show that R is an equivalence relation if and only if $(a, b)$ and $(a, c)$ are in R implies that $(b, c)$ is in R.

*Or*

16. Let P be the set of all people. Set R be a binary relation such that $(a, b)$ is in R if a is $a$ brother of $b$. Is R reflexive ? Symmetric ? Anti-symmetric ? Transitive ? An equivalence relation ? A partial ordering relation ?

17. (a) Show that the lattice $\langle S_n, D \rangle$ for $n = 216$ is isomorphic to the direct product of lattices for $n =$ 8 and $n = 27$.

(b) In a lattice $\langle L, \leq \rangle$ with $a, b, c \in L$, prove that $b \leq c \Rightarrow a * b \leq a * c$.

*Or*

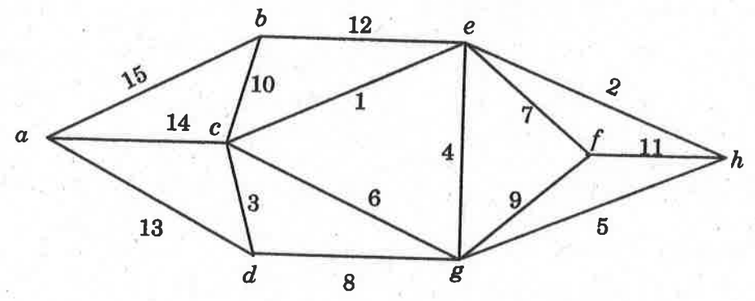
18. If $p$ and $q$ are elements in a bounded distributive lattice $(L, \leq \wedge, \vee)$ and if $p^T$ is the complement of $p$, then show that $p \vee (p^T \wedge q) = p \vee q$ and $p \wedge (p^T \vee q) = p \wedge q$.

19. (a) Show that the sum of the squares of the in-degrees over all vertices is equal to the sum of the squares of the out-degrees over all vertices in any directed complete graph.

(b) Show that in a linear planar graph with less than 30 edges has a vertex of degree 4 *or* less.

*Or*

20. Determine the minimum spanning tree for the graph shown below :




(5 × 12 = 60 marks)

F 3122 (Pages : 3) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

## Third Semester

Branch : Information Technology

DIGITAL ELECTRONICS (T)

(Prior to 2010 Admissions—Old Scheme)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

### Part A

*Answer* **all** *questions briefly.*
*Each question carries* 4 *marks.*

1. Express the decimal 75 in :
   (i) Binary ;
   (ii) BCD ;
   (iii) Octal ;
   (iv) hexadecimal ;
   (v) grady code and
   (vi) excess-3 code.
2. Obtain the standard canonical forms of the following :—
   (i) $\bar{A}C + A\bar{B}$
   (ii) $(AB + C)(B + AC)$
3. What is code converter ? Explain the principle of a BCD to binary converter.
4. Form a multiplexer tree to give a 4-to-1 MUX using 2-to-1 multiplexers.
5. What is meant by latch-up in CMOS logic gates ? Explain.
6. Explain the meaning of totem pole output. What are its applications ?
7. Explain the different methods of triggering flip-flops.
8. Draw the circuit diagram of a dynamic RAM cell and describe the read and write operations.
9. What factors determine whether a counter operates as a count up or count down ?
10. The content of a 4-bit register is initially 1011. The register is shifted 7 times to the right with the serial input being 1010110. What is the content of the register after each shift ?

(10 × 4 = 40 marks)

**Turn over**

## Part B

*Answer* **all** *questions.*
*Each full question carries* 12 *marks.*

11. (a) Simplify the following Boolean functions :

(i) $f_1 = \bar{a}\bar{c}d + \bar{a}cd + \bar{b}\bar{c}\bar{d} + a\bar{b}c$.

(ii) $f_2 = (a + b)(a + \bar{c})$.

(b) Obtain a NOR gate realization of the Boolean expression $f = \Sigma m$ (0, 3, 6, 9, 10, 12, 15).

*Or*

12. Simplify the function $f = \Sigma m$ (0, 2, 3, 4, 8, 10, 12, 13, 14) using Quine Mc Clauskey method and draw the minimal logic circuit using only NAND gates.

13. (a) Implement the function $f = \Sigma m$ (4, 5, 7, 8, 10, 12, 15) using 4 : 1 MUX and internal gate if '$a$' and '$b$' are connected to select lines $a_1$ and $a_0$ respectively.

(b) Implement a full adder circuit using a decoder and OR gates and draw the circuit.

*Or*

14. (a) Draw the circuit diagram of 8 bit BCD adder and explain the operation for addition of two numbers given, that is 22 and 23.

(b) Explain with a circuit diagram the magnitude comparator.

15. (a) What is meant by wired AND connection of digital ICs ? What are its advantages ? Draw a circuit of TTL gates will wired AND connection and explain.

(b) Draw the circuit of 4-input ECL OR-NOR gate and explain its working.

*Or*

16. (a) Draw and discuss the input and output characteristics of TTL gate.

(b) With a typical logic gate circuit diagram, explain the principle of IIL family.

17. A combinational circuit is defined by following functions :

$f_1 = \Sigma$ (3, 5, 6, 7)

$f_2 = \Sigma$ (0, 2, 4, 7)

Implement the circuit with a PLA having 3 inputs, four product terms and two outputs. Discuss the advantages of such realisation.

*Or*

18. (a) Implement the following Boolean expressions :—

$f_1 = \Sigma m$ (0, 1, 2, 5, 7)

$f_2 = \Sigma m$ (1, 2, 4, 6)



(b) Draw the logic diagram of :

(i) SR latch ;

(ii) gated D latch ;

(iii) master-slave JK flip-flop.

19. Draw the circuit diagram of a decade counter (up count) using count reset. With timing diagrams and function table, explain the working.

*Or*

20. Design and draw a counter with T flip-flops that goes through the following repeated sequence : 0, 1, 3, 7, 6, 4. Show that when binary states 010 and 101 are considered as don't care conditions, the counter may not operate properly. Find a way to correct the design.

(5 × 12 = 60 marks)

**F 3096** (Pages : 3) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

**Third Semester**

Branch : Computer Science and Engineering/Information Technology

SOLID STATE ELECTRONICS (R, T)

(Prior to 2010 Admissions—Old Scheme)

(Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

## Part A

*Answer* **all** *questions briefly.*
*Each question carries 4 marks.*

1. Define d.c. load line and Q-point.
2. Draw the circuit and explain the emitter follower with capacitor load.
3. With neat circuit diagram, explain self biasing circuit for *n*-channel JFET.
4. Why a FET is known as unipolar device ? How do you compare this device with BJT ?
5. Find the frequency of the oscillations of transistorised Colpits oscillator having tank circuit parameters as $C_1$ = 150 pF, $C_2$ = 1.5 nF and L = 50 μH.
6. Explain how oscillations are initiated and later sustained in an oscillator circuit.
7. Draw the input and output waveforms of a low pass RC circuit to a pulse input.
8. What is commutating capacitor ? Explain its function in a multivibrator circuit.
9. What are the various types of IC voltage regulators ? Explain the operation of any *one* IC voltage regulator.
10. Explain the differences between a TRIAC and thyristor. Enlist the applications of TRIAC.

(10 × 4 = 40 marks)

## Part B

*Answer* **all** *questions.*
*Each question carries 12 marks.*

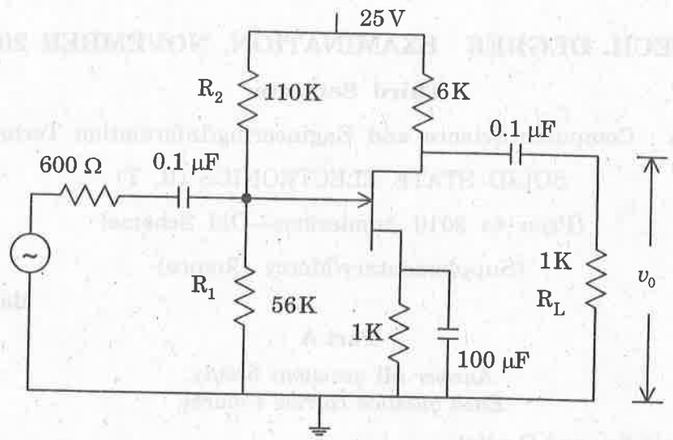
11. For the base bias circuit, (a) $R_B$ = 150 kΩ and ; (b) $R_B$ = 100 kΩ. Calculate $I_B$, $I_C$ and $V_{CE}$ if $V_{CC}$ = 12 volt, $R_C$ = 1.1 kΩ and β = 100. Also identify the operating regions of the transistor.

*Or*

12. Draw the Darlington pair circuit and derive its $R_i$, $A_i$, $A_v$ and $R_o$.

**Turn over**

13. For the JFET amplifier circuit shown below :




$g_m$ = 2.5 mS, $r_d$ = 200 $k\Omega$, $C_{gs}$ = 12 pF, $C_{gd}$ = 2pF $R_1//R_2$ = 0.1 M, $C_W + C_L$ = 10 pF

(i) Draw the linear circuit for midfrequencies and calculate the midfrequency gain.

(ii) Determine the low frequency cut-offs caused by the input and output circuits. Which one of these is the low frequency cut-off of the complete frequency response ?

*Or*

14. With neat diagrams explain the construction of an enhancement type p-channel MOSFET. Draw and explain its static characteristics. How is the threshold voltage of the MOS transistor adjusted ?

15. In a transistorised Hartley oscillator the two inductances are 2 mH and 20 μH while the frequency is to be changed from 950 KHz to 2050 KHz. Calculate the range over which the capacitor is to be varied. Draw the circuit and explain how sine waves are produced in it ?

*Or*

16. With neat circuit diagram, explain how sine was are produced in a transistor Wienbridge oscillator. Compare and contrast it with RC phase shift oscillator.

17. Draw the circuit diagram of astable multivibrator using transistors. Prove that the expression for the period of oscillation is 2T log 2, taking into account the $V_{CE_{sat}}$, $V_{BE_{sat}}$ and the cut-in voltage of the transistor.

*Or*



18. With a neat circuit diagram, describe the working of a transistorised Bootstrap time base generator. Explain clearly, the quiescent conditions, the formation of sweep, the retrace interval and the recovery process.

19. Explain the voltage adjustment provided by LM 317. Explain a circuit using LM 317 to obtain $V_0$ from 5V to 12 V, $I_0$ = 1 Amp. Design your circuit diagram.

*Or*

20. With a neat constructional diagram, explain the working of SCR. Explain its VI characteristics and describe how controlled rectification can be achieved ?

(5 × 12 = 60 marks)

F 3089 (Pages : 6) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

**Third Semester**

Branch : Information Technology

ELECTRICAL CIRCUITS AND SYSTEMS (T)

(Prior to 2010 Admissions—Old Scheme)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

## Part A

*Answer* **all** *questions briefly.*
*Each question carries 4 marks.*

1. If $v_c$ (0) = 15 V, find $v_c$, $v_x$ and $i_x$ for $t > 0$ for the circuit shown in Fig. 1.

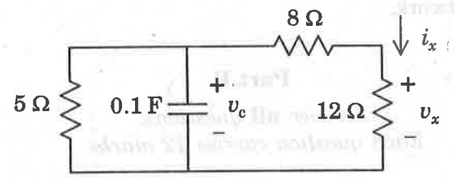



Fig. 1

2. Calculate the steady state current through an inductor of 0.2H, if a voltage $v = 24 \cos (60t + 30°)$ is applied to it ?

3. Explain the term time constant for RC and RL circuits.

4. The d.c. voltage applied to a coil of resistance R and inductance L is suddenly changed from $V_1$ to $V_2$. Derive from basics, an expression for the transient current.

5. Find the Laplace Transforms of (i) $t \cos (2t)\ u\ (t)$ ; (ii) $t^2 \sin (2t)\ u\ (t)$.

6. Explain how to get the Laplace Transform of unit step function.

7. Define and distinguish between (i) Complex frequency ; and (ii) natural frequency.

**Turn over**

8. Find the $\frac{V_o}{V_i}$ for the following circuit in Fig. 2.

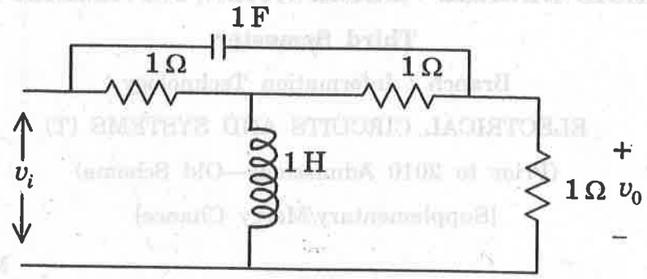



Fig. 2

9. Plot poles and zeros of $\frac{(s+1)^2(s+4)}{(s+2)(s+3+j2)(s+3-j2)}$.

10. The impedance parameters of a T network are $Z_{11} = 50\ \Omega$, $Z_{12} = Z_{21} = 25\ \Omega$, $Z_{22} = 100\ \Omega$. Find the parameters of the network.

(10 × 4 = 40 marks)

## Part B

*Answer* **all** *questions.*
*Each question carries 12 marks.*

11. (a) Using repeated source transformation theorem, find the Norton equivalent for the following (Fig. 3) :—

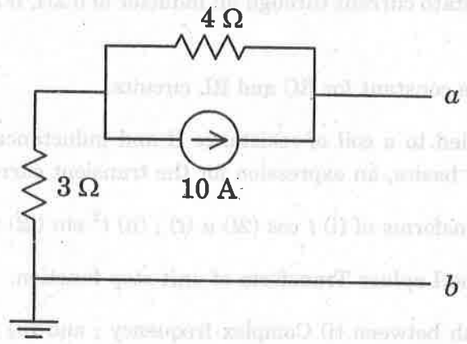



Fig. 3

18. Find the Norton's and Thevenin's equivalents for the following circuit in Fig. 13.

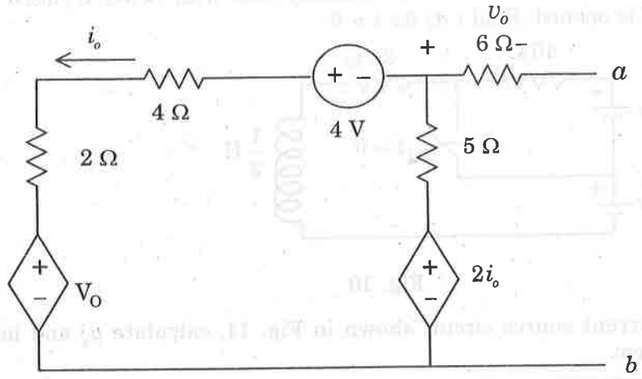



Fig. 13.

19. (a) For a certain two-port network $v_1$ and $v_2$ are :

$v_1 = 60\ I_1 + 20\ I_2$

$v_2 = 20\ I_1 + 40\ I_2$. Find the Y parameters of the network.

(b) Obtain the conditions for the reciprocity of ABCD parameters.

*Or*

20. Find the driving point impedance function for the network shown in Fig. 14 and plot its pole-zero diagram.

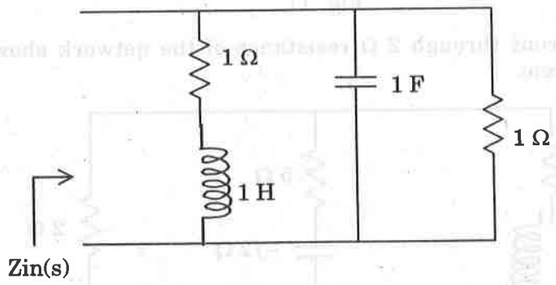



Fig. 14

(5 × 12 = 60 marks)



(b) For the following circuit (Fig. 4), find $i(t)$ for $t > 0$ if the switch is opened at $t = 0$.

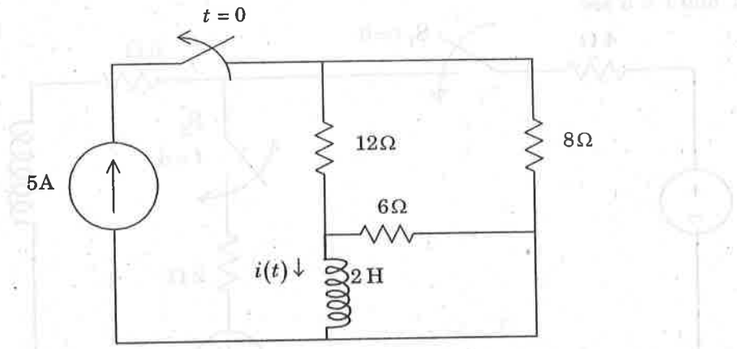



Fig. 4

*Or*

12. (a) A capacitor 4.7 μF being charged internally to 10 V is connected to a resistor of 10 kΩ and is allowed to discharge through it by switching of a switch S (Fig. 5). Find the expression of discharging the capacitor.

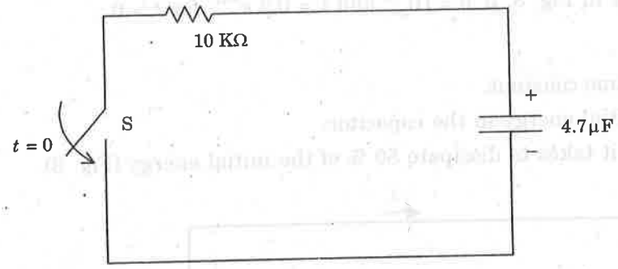



Fig. 5

(b) Five lines A, B, C, D, E run to a common point O with the supply voltages and resistances as shown in Fig. 6. Find $V_o$ and the current leaving each supply point (Fig. 6).

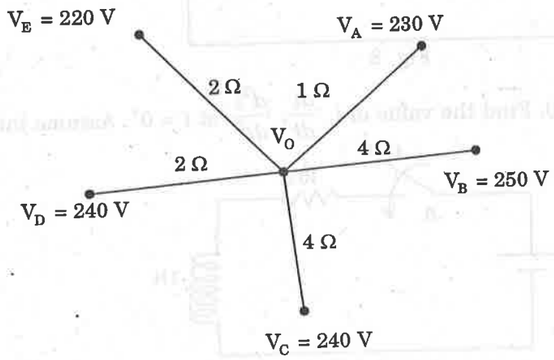



Fig. 6

13. At $t = 0$, switch $S_1$ in Fig. 7 is closed and switch $S_2$ is closed 4 sec. later. Find $i\,(t)$ for $t > 0$. Calculate $i$ for $t = 2$ sec. and $t = 5$ sec.

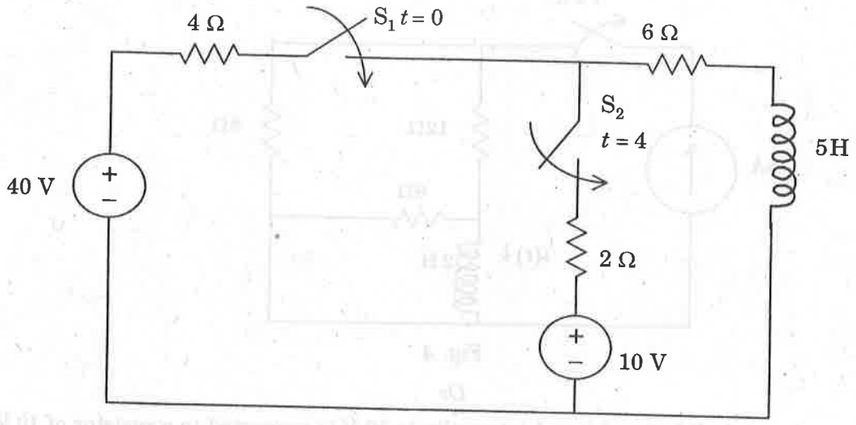



Fig.7

*Or*

14. For the following circuit in Fig. 8, if $v = 10e^{-4t}$ and $i = 0.2\,e^{-4t}$, for $t > 0$ :

(a) find R and C.

(b) determine the time constant.

(c) calculate the initial energy in the capacitor.

(d) obtain the time it takes to dissipate 50 % of the initial energy (Fig. 8).

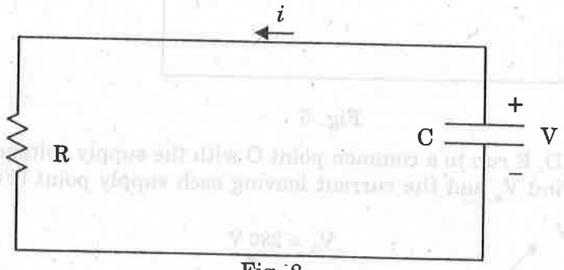



Fig. 8

15. The switch S is closed at $t = 0$. Find the value of $i$, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$. Assume initial current of inductor to be zero at $t = 0$.

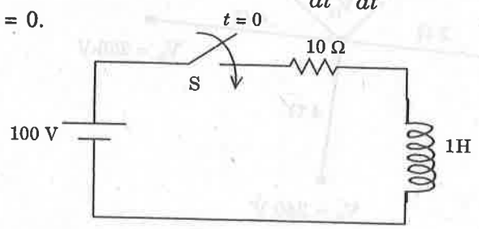



Fig. 9

*Or*



16. The network shown in Fig. 10 below reaches a steady state with switch S closed for a long time. At $t = 0$, the switch is opened. Find $i\,(t)$ for $t > 0$.

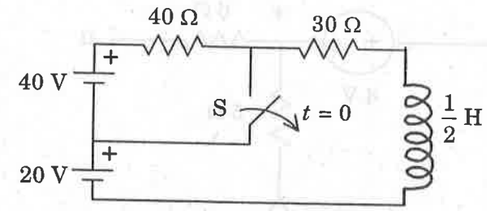



Fig. 10

17. (a) In the single current source circuit shown in Fig. 11, calculate $v_x$ and hence verify the reciprocity theorem.

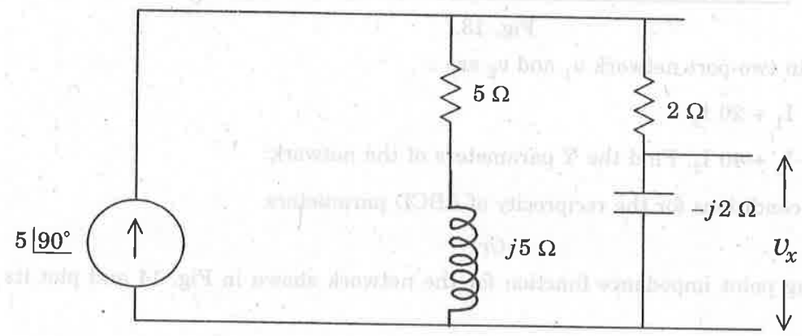



Fig. 11

(b) Calculate the current through 2 Ω resistance of the network shown in Fig. 12, using superposition theorem.

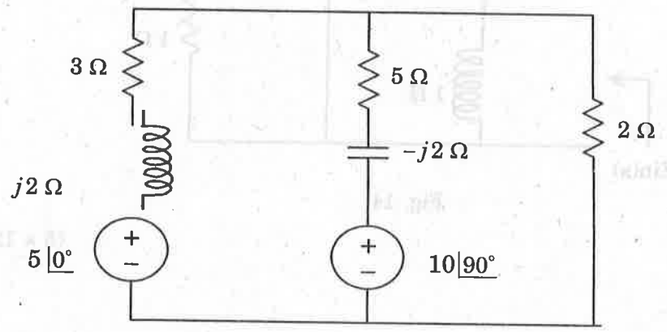



Fig. 12

*Or*

**F 3082** (Pages : 3) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

**Third Semester**

Branch : Computer Science/Information Technology

ENGINEERING MATHEMATICS II—(R,T)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

*Answer any* **one** *full question from each module.*
*Each full question carries* 20 *marks.*

## Module 1

1. (a) Let $m$ and $n$ be integers. Prove that $n^2 = m^2$ if and only if $n$ is $m$ or $n$ is $-m$.

   (b) "If there was a ball game, then travelling was difficult. If they arrived on time, then travelling was not difficult. They arrived on time. Therefore, there was no ball game". Show that these statements constitute a valid argument.

*Or*

2. (a) Construct the truth table for $(P \to Q) \wedge (Q \to P)$.

   (b) Show that $p \to q, \sim (q \vee r) \Rightarrow \sim p$.

   (c) Symbolize : "All the world loves a lover".

## Module 2

3. (a) Show that one of any $m$ consecutive integers is divisible by $m$.

   (b) Let R be a binary relation on the set of all strings of 0s and 1s such that $R = \{(a, b) | a$ and $b$ are strings that have the same number of 0s$\}$. Is R reflexive ? Symmetric ? Antisymmetric ? Transitive ? An equivalence relation ? A partial ordering relation.

*Or*

4. (a) Let R be a binary relation from A to B. The converse of R, devoted $R^{-1}$, is a binary relation from B to A such that $R^{-1} = \{(b, a) | (a, b) \in R\}$ Let $R_1$ and $R_2$ be binary relations from A to B. Is it true that $(R_1 \cup R_2)^{-1}\ R_1^{-1} \cup R_2^{-1}$ ?

**Turn over**

(b) Explain Pigeonhole principle. using it, show that if any 5 numbers from 1 to 8 are chosen, then two of them will add upto 9.

**Module 3**

5. (a) Show that for any elements $a, b, c$ in a modular lattice

$(a \vee b) \wedge c = b \wedge c$ implies $(c \vee b) \wedge a = b \vee a$.

(b) Show that a lattice $(A, \leq)$ is distributive if and only if for any elements $a$, $b$ $c$ in A,

$(a \wedge b) \vee (b \wedge c) \vee (c \wedge a) = (a \vee b) \wedge (b \vee c) \wedge (c \vee a)$.

*Or*

6. (a) Show that $(a * b)' = a' \oplus b'$ and $(a \oplus b)' = a' * b'$ hold in a complemented, distributive lattice.

(b) Show that the lattice $\langle S_n, D \rangle$ for $n = 216$ is isomorphic to the direct product of lattices for $n = 8$ and $n = 27$.

**Module 4**

7. (a) Find a simple expression for the generating function of the discrete numeric function :

$0 \times 1, 1 \times 2, 2 \times 3, 3 \times 4, \ldots\ldots\ldots$

(b) Solve the recurrence relation $a_r - 2a_{r-1} + 2a_{r-2} - a_{r-3} = 0$, given that $a_0 = 2$, $a_1 = 1$ and $a_2 = 1$.

*Or*

8. (a) Determine the discrete numeric function corresponding to the generating function

$$A(z) = \frac{7z^2}{(1-2z)(1+3z)}.$$

(b) Let $4a_r + c_1 a_{r-1} + c_2 a_{r-2} = f(r), r \geq 2$ be a second order linear recurrence with constant coefficients. For some boundary conditions $a_0$ and $a_1$, the solution of the recurrence is $1 - 2r + 3 \cdot 2^r$. Determine $a_0$, $a_1$, $c_1$, $c_2$ and $f(r)$.

**Module 5**

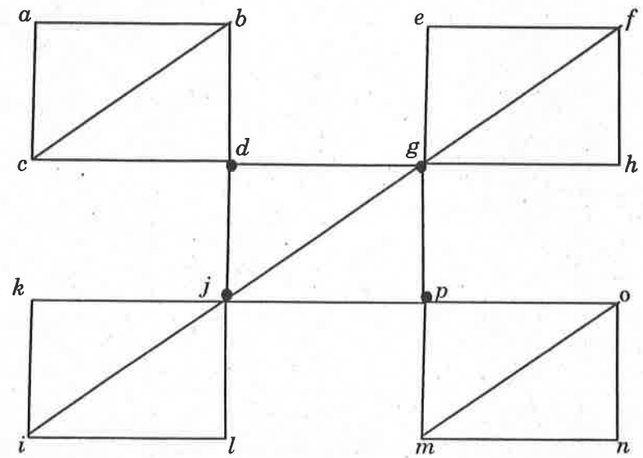
9. (a) Show that in a connected planar linear graph with 6 vertices and 12 edges, each of the regions is bounded by 3 edges.



(b) Show that the sum of the in-degrees over all vertices is equal to the sum of the out-degrees over all vertices in any directed graph.

*Or*

10. Draw the different spanning trees in the following graph :




(5 × 20 = 100 marks)

10. (a) From the following data :

| | | | | | | |
|---|---|---|---|---|---|---|
| $x$ : | 0.00 | 0.05 | 0.10 | 0.15 | 0.20 | 0.25 |
| $y$ : | 0.00000 | 0.10018 | 0.20132 | 0.30458 | 0.41075 | 0.52110 |

Evaluate $\frac{dy}{dx}$ at $x = 1.00$.

(b) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$ and $x = 1.6$.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $x$ : | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
| $y$ : | 7.989 | 8.413 | 8.782 | 9.129 | 9.452 | 9.750 | 10.022 |

(5 × 20 = 100 marks)

# F 3081

(Pages : 4) Reg. No.....

Name.....

## B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

**Third Semester**

Branch : Common to all Branches except Computer Science and Information Technology

ENGINEERING MATHEMATICS—II (CMEPLANSUF)

(Old Scheme—Prior to 2010 admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

*Answer any* **one** *full question from each module.*
*Each full question carries* 20 *marks.*

### Module 1

1. (a) Verify the formula, $\frac{d}{dt}\left(\vec{A}\cdot\vec{B}\right) = \vec{A}\cdot\frac{d\vec{B}}{dt} + \frac{d\vec{A}}{dt}\cdot\vec{B}$ for $\vec{A} = 5t^2\hat{i} + t\,\hat{j} - t^3\hat{K}, \vec{B} = \sin t\,\hat{i} - \cos t\,\hat{j}$.

(b) A particle (position vector $\vec{r}$) is moving in a circle with constant angular velocity $w$. Show by vector methods, that the acceleration is equal to $-w^2\vec{r}$.

(c) If $u = x^2 + y^2 + z^2$ and $\vec{V} = x\,\hat{i} + y\,\hat{j} + z\,\hat{k}$, show that $\text{div}\left(u\vec{V}\right) = 5u$.

*Or*

2. (a) If $u = x + y + z$, $v = x^2 + y^2 + z^2$, $w = yz + zx + xy$, prove that :

$$(\text{grad } u)\cdot\left[(\text{grad}(V))\times(\text{grad}(w))\right] = 0.$$

(b) Show that the vector field $\vec{A}$, where $\vec{A} = \left(x^2 - y^2 + x\right)i - (2xy + y)\,\hat{j}$ is irrotational, and find the scalar $\phi$ such that $A = \text{grad}\,\phi$.

### Module 2

3. (a) Find the work done in moving a particle once round the circle $x^2 + y^2 = 9$ in the $x$-$y$-plane if the field of force is $\vec{F} = (2x - y - z)\,\hat{i} + \left(x + y - z^2\right)\hat{j} + (3x - 2y + 4z)\,\hat{k}$.

(b) Show that $\iint_S \vec{F}\cdot\hat{n}\,dS = \frac{3}{2}$, where $\vec{F} = 4xz\,\hat{i} - y^2\hat{j} + yz\,\hat{k}$ and S is the surface of the cube bounded by the planes $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.

(c) Use divergence theorem to show that $\oint_C r^n\vec{r}\cdot d\vec{S} = (n+3) = \int_V r^n dV (n \neq -3)$.

*Or*

4. (a) If S is any closed surface enclosing a volume V and $\vec{F} = x\,\hat{i} + 2y\,\hat{j} + 3z\,\hat{k}$, prove that

$$\iint_S \vec{F}\cdot\vec{n}\,dS = 6V$$

(b) Verify Stoke's theorem for the function $\vec{F} = x^2\,\hat{i} + xy\,\hat{j}$ integrated round the square whose sides are $x = 0, y = 0, x = a$ and $y = a$ in the plane $z = 0$.

(c) The acceleration of a particle at any time $t$ is given by $\vec{a} = 12\cos 2t\,\hat{i} - 8\sin 2t\,\hat{j} + 16t\,\hat{k}$. If the velocity $\vec{v}$ and displacement $\vec{r}$ are zero at $t = 0$, find $\vec{v}$ and $\vec{r}$ at any time $t_i$.

**Module 3**

5. (a) If $z_0$ is the upper half of the $z$-plane, show that the bilinear transformation $w = e^{i\alpha}\left(\frac{z - z_0}{z - z_0}\right)$ maps the upper half of the $z$-plane into the interior of the unit circle at the origin in the $w$-plane.

(b) Find the analytic function whose real part is $e^x(x\cos y - y\sin y)$.

(c) Show that the transform $w = z + \frac{(a^2 - b^2)}{4z}$ transforms the circle of radius $\frac{a+b}{2}$, centre at the origin, in the $z$-plane into ellipse of semi-axes $a$, $b$ in the $w$-plane.

*Or*

6. (a) If $f(z)$ is an analytic function prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)\log|f'(z)| = 0$.



(b) If $w = \phi + i\,\psi$ represents the complex potential for an electric field and $\psi = x^2 - y^2 + \frac{x}{x^2 + y^2}$, determine the function $\phi$.

(c) Under the transformation $w = \frac{z - i}{1 - iz}$, find the map of the circle $|z| = 1$ in the $w$-plane.

**Module 4**

7. (a) Evaluate $\Delta^2\cos(cx + d)$, the interval of differencing being $h$.

(b) If $u_0 = 3, u_1 = 12, u_2 = 81, u_3 = 200, u_4 = 100, u_5 = 8$, find the value of $\Delta^5 u_0$.

(c) A function $f(x)$ is given by the following table. Find $f(0.2)$ by a suitable formula :

| $x$ : | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| $f(x)$ : | 178 | 183 | 190 | 202 | 218 | 222 | 230 |

*Or*

8. (a) Use Lagrange's interpolation formula to find the value of $y$ when $x = 10$, if the following table of $x$ and $y$ is given :

| $x$ : | 5 | 6 | 9 | 11 |
|---|---|---|---|---|
| $y$ : | 12 | 13 | 14 | 16 |

(b) Apply Stirling's formula to find $f(0.42)$ if $f(0.30) = 0.1179, f(0.35) = 0.1368, f(0.40) = 0.1554, f(0.45) = 0.1736, f(0.50) = 0.1915$.

**Module 5**

9. (a) The following table gives the values of a function at equal intervals :

| $x$ : | 0.0 | 0.5 | 1.0 | 1.5 | 2.0 |
|---|---|---|---|---|---|
| $f(x)$ : | 0.3988 | 0.3522 | 0.2421 | 0.1290 | 0.0541 |

Evaluate $f(1.8)$, $f'(1.5)$ and $\int_0^2 f(x)\,dx$, stating the formula used. (15 marks)

(b) Solve $u_{n+2} - 7u_{n+1} + 10u_n = 12e^{3n} + 4^n$. (5 marks)

*Or*

**F 3151** (Pages : 3) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

## Third Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 305/IT 010 304—SWITCHING THEORY AND LOGIC DESIGN (CS, IT)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

## Part A

*Answer* **all** *questions briefly.*
*Each question carries* 3 *marks.*

1. Find the value of $x$ in the following :—

   (a) $(847)_{10} = (x)_{16}$.

   (b) $(10110101)_2 = (x)_8$.

   (c) $(A3BH)_{16} = (2619)_{10}$.

2. Draw a half adder circuit using NOR gates only.

3. Write down the truth table and characteristic equation of SR flip-flop.

4. How are shift-left or shift-right transfer registers built ?

5. What do you mean by hazard-free asynchronous sequential circuits ?

(5 × 3 = 15 marks)

## Part B

*Answer* **all** *questions.*
*Each question carries* 5 *marks.*

6. Convert the following into cannonical forms :

   (a) $\overline{A}B + AB\overline{C}D + \overline{B}\,\overline{C}$.

   (b) $(\overline{A} + C)(A + \overline{B})(B + C)$.

7. Using full-adder blocks, represent the following 4-bit addition :

   1111 + 1011.

**Turn over**

8. Distinguish between truth table and excitation table, taking JK flip-flop as example. How the excitation table can be derived from the truth table ?

9. Construct a Johnson counter for ten timing signals ?

10. What is fault tolerance ? Explain different fault tolerance techniques.

(5 × 5 = 25 marks)

## Part C

*Answer* **all** *questions.*
*Each full question carries* 12 *marks.*

11. Design the circuit for a 2 bit BCD-to- binary coverter, with the help of the function tables.

*Or*

12. Reduce using Quine McCluskey method $S = \sum (1, 2, 4, 5, 6, 8, 9, 12) + d\,(3, 10, 13, 15)$. Draw reduced prime implicants table and the minimal reduced circuit.

13. (a) What is a full subtractor ? Design the same using K-maps and draw the minimal circuit. (6 marks)

(b) With a neat block diagram, explain a 4 bit carry look-ahead adder. (6 marks)

*Or*

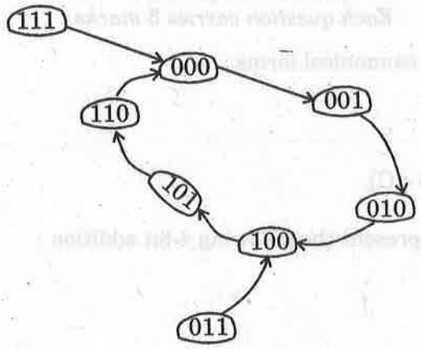
14. Design a gray-to-binary code converter using 4 : 1 MUX. Draw the circuit diagram and explain.

15. A network produces a '1' output if and only if the current input and the previous three inputs correspond to either of the sequences 0110 or 1001. The output '1' is to occur at the time of the fourth input of the recognised sequence. Outputs of zero are to be produced at all other time. Construct the state diagram.

*Or*

16. Design a sequential machine with one input and one output line such that the output becomes '1' when the input receives a sequence 101. Overlapping of sequence is allowed. Use D-flip-flops.

17. Design a synchronous counter using JK flip-flop for the state diagram given in figure.




*Or*



18. (a) With neat diagrams and waveforms, explain a 4 bit shift register with left/right shift control and with parallel load control. (6 marks)

(b) Design a mod-77 synchronous counter by cascading two 4-bit binary counters. (6 marks)

19. (a) With an example, explain one method of designing a hazard-free network. (5 marks)

(b) Design the following network, which is free of static and dynamic hazards. Design the circuit using NAND gates only $F(a, b, c, d) = \sum m\,(1, 5, 7, 14, 15)$. (7 marks)

*Or*

20. (a) Draw the internal circuit diagram of a CMOS NAND gate and explain its working. (7 marks)

(b) Compare the performance parameters of TTL, CMOS and ECL families. (5 marks)

(5 × 12 = 60 marks)