B.Tech. Degree III Semester Examination November 2013

IT/CS/EC/CE/ME/SE/EB/EI/EE/FT 301 ENGINEERING MATHEMATICS II

(2006 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

$(8 \times 5 = 40)$

I. (a) Examine the following system of equations for consistency

$$2x - 3y + 7z = 5$$
$$3x + y - 3z = 13$$
$$2x + 19y - 47z = 32$$

(b) Let $V_1 = (1,-1,0)$, $V_2 = (0,1,-1)$ and $V_3 = (0,0,1)$ be elements of R^3. Show that the set of vectors $\{V_1, V_2, V3\}$ is linearly independent.

(c) Obtain the Fourier series of $f(x) = |x|$ in $-\pi < x < \pi$, $f(x+2\pi) = f(x)$

(d) Find the Fourier cosine transform of

$$f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2 - x & \text{for } 1 < x < 2 \\ 0 & \text{for } x > 2 \end{cases}$$

(e) Find the Laplace transform of $\dfrac{\cos at - \cos bt}{t}$.

(f) Find the inverse Laplace transform of $\log\left(\dfrac{s+a}{s+b}\right)$

(g) Find a unit vector perpendicular to the surface $x^3 - xyz + z^3 = 1$ at $(1, 1, 1)$.

(h) Find the work done in moving a particle in the force field $F = 3x^2\vec{e} + (2xz - y)\vec{j} + z\vec{k}$ along the straight line from (0, 0, 0) to (2, 1, 3).

PART B

$(4 \times 15 = 60)$

II. (a) Using elementary transformation reduce the following matrix to its normal form. (7)

$$\begin{bmatrix} 1 & 2 & 0 & -1 \\ 3 & 4 & 1 & 2 \\ -2 & 3 & 2 & 5 \end{bmatrix}$$

(b) Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$. (8)

OR

III. (a) Using Cayley Hamilton theorem find A^{-1} if $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$. (8)

(b) $T : R^4 \to R^3$ (7)

$$T\begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} = \begin{bmatrix} x + y + w \\ z \\ y + 2w \end{bmatrix}.$$

Find $Ker(T)$ and $ran(T)$ and their dimensions.

(P.T.O.)

IV. (a) Obtain a half range cosine series for (8)

$$f(m) = kx \quad \text{for } 0 \le x \le \ell/2$$
$$= k(\ell - x) \quad \text{for } \ell/2 \le x \le \ell$$

Deduce the sum of the series $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots$

(b) Solve the integral equation (7)

$$\int_0^\infty f(x) \sin tx \, dx = 1 \quad 0 \le t < 1$$
$$2 \quad 1 \le t < 2$$
$$0 \quad t \ge 2$$

OR

V. (a) If $f(x) = |\cos x|$ expand $f(x)$ as a Fourier series in the interval $(-\pi, \pi)$. (8)

(b) Using the Fourier integral representation show that (7)

$$\int_0^\infty \frac{\omega \sin x\omega}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x} \quad (x > 0).$$

VI. (a) Find the Laplace transform of the periodic function and using this find the Laplace transform of the function (10)

$$f(t) = \sin \omega t \quad 0 < t < \pi/\omega$$
$$0 \quad \pi/\omega < t < \frac{2\pi}{\omega}$$

(b) Apply convolution theorem to evaluate $L^{-1}\left[\frac{1}{s(s^2+4)}\right]$. (5)

OR

VII. (a) Use Laplace transform method to solve $\frac{d^2x}{dt^2} + 9x = \cos 2t$ if $x(0) = 1$, $x(\pi/2) = -1$. (5)

(b) Find the inverse Laplace transform (10)

(i) $\frac{s+1}{s^2+4s+5}$

(ii) $\frac{s^2+6}{(s^2+1)(s^2+4)}$

VIII. (a) Prove that $curl(grad\,\phi) = 0$. (6)

(b) Apply Stoke's theorem to evaluate $\int_C ydx + zdy + xdz$ where C is the curve of intersection of $x^2 + y^2 + z^2 = a^2$ and $x + z = a$. (9)

OR

IX. (a) Verify divergence theorem for $F = 4xz\vec{e} - y^2\vec{j} + yzk$ over the cube bounded by $x = 0,\ x = 1,\ y = 0,\ y = 1,\ z = 0,\ z = 1$. (9)

(b) A vector field is given by $F = (x^2 - y^2 + x)\vec{e} - (2xy + y)\vec{j}$ show that the field is irrotational and find its scalar potential. (6)

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B.Tech. Degree III Semester Examination November 2013

IT/ME/EC/EB/EI 302 ELECTRICAL TECHNOLOGY

(2006 Scheme)

Time : 3 Hours | Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) Draw and explain the phasor diagram of practical transformer when its is connected to a capacitive load.

(b) Derive the emf equation of a DC generator.

(c) Explain critical field resistance and critical speed from open circuit characteristics of DC shunt generator.

(d) Explain cross magnetising and demagnetizing effect of armature reaction in DC generators.

(e) Discuss on pitch factor, pole pitch distribution factor and coil span with respect to an Alternator.

(f) A 6 pole induction motor is fed from 50Hz supply. If the frequency of rotor emf at full load is 2Hz find full load speed and slip.

(g) Derive the condition for maximum starting torque for 3 phase induction motor.

(h) Explain classification of substations.

PART B

(4 x 15 = 60)

II. (a) Derive the condition for maximum efficiency of single phase transformer. (3)

(b) A 15 KVA, 2300/230V, 50Hz single phase transformer gave the following test data (12)
OC – 2300V, 0.21A, 50IN
SC – 47V, 6A, 160W
(i) Find the equivalent circuit referred to high voltage side
(ii) Calculate full load voltage regulation at 0.8pf lagging when the load voltage is held at 230V.

OR

III. (a) Explain the working of auto transformer with diagram. (5)

(b) A 230/460V transformer has a primary resistance of 0.2Ω and a reactance of 0.5Ω and corresponding values for the secondary are 0.75Ω and 1.8Ω respectively. Find the secondary terminal voltge when supplying (i) 10A at 0.8 pf lagging (ii) 10A at .8pf leading. (10)

IV. (a) Explain power flow diagram of DC generator. (5)

(b) A short shunt compound generator supplies a load current of 100A at 250V. The generator has the following winding resistances shunt field 130Ω, armature 0.1Ω and series field 0.1Ω. Find the emf generated, if brush drop is 1V per brush. (10)

OR

V. (a) Discuss on various methods of speed control of DC series motors. (5)

(b) A 250V shunt motor runs at 100rpm at no load and taken 8A. The total armature and field resistances are 0.2Ω and 250Ω respectively. Calculate the speed when loaded and taking 50A. Assume flux to be constant. (10)

(P.T.O.)

VI. (a) Explain the working of synchronous motor at leading and lagging loads. (5)

(b) A 3 phase star connected 1000KVA, 11000V alternator has 52.5A. The AC resistance of winding per phase is 0.45Ω. The test results are given below: (10)
OC – field current = 12.5A, voltage between lines = 422V
SC – field current = 12.5A, Line current = 52.5A.
Determine the full load voltage regulation of alternator at (i) .8pf lag (ii) .8pf lead

OR

VII. (a) Explain the classification of 3 phase AC motors. (5)

(b) A 440V, 50HZ 3 phase induction motor draws an input power of 76KW from the mains. The rotor emf takes 120 complete cycles/minute. Its stator losses are 1KW and rotor current per phase is 62A. Calculate (i) rotor copper losses per phase (ii) torque developed (iii) rotor resistance per phase. (10)

VIII. (a) Explain the working of Thermal Power Plant with neat schematic diagram. (12)

(b) Explain different types of insulators in power system. (3)

OR

IX. (a) Explain different DC transmission schemes. (5)

(b) Explain economic load dispatch. (5)

(c) Discuss on various switch gears in power system. (5)

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B. Tech. Degree III Semester Examination November 2013

IT/CS 303 DISCRETE COMPUTATIONAL STRUCTURES

(2006 Scheme)

Time : 3 Hours | Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) Prove that $P \wedge (q \wedge \sim P)$ is a contradiction.

(b) By mathematical induction prove that

$$5+10+15+ \ldots +5n = \frac{5n(n+1)}{2}$$

(c) What is recursive algorithm. Write a recursive algorithm to find the maximum at a finite sequence of numbers.

(d) From a club consisting of 6 men and 7 women, in how many ways we can select a committee of 3 men and 4 women?

(e) Define bipartite graph with an example.

(f) Show that the number of vertices of odd degree in a graph is always even.

(g) Let G be a group and f: G → G given by $f(x) = x^{-1}$ is an isomorphism. Prove that G is abelian.

(h) Define a ring.

PART B

(4 x 15 = 60)

II. (a) Among 100 students, 32 study mathematics, 20 study physics, 45 study chemistry, 15 study mathematics and chemistry, 7 study mathematics and physics, 10 study physics and chemistry, 30 do not study any of three subjects. Find the number of students studying exactly one of the three subjects. (8)

(b) Using truth table, prove that (7)

$$P \vee (q \wedge r) \equiv (P \vee q) \wedge (P \vee r)$$

OR

III. (a) Define an equivalence relation. If R and S are equivalence relations on a set, show that RNS is also an equivalence relation. (7)

(b) Consider the functions f, g: R → R defined by $f(x) = x^2 + 3x + 1, g(x) = 2x - 3$ .Find the composition function

(i) (*i*) *fof* (*ii*) *fog* (*iii*) *gof* (*iv*) *gog* (8)

IV. (a) Solve the recurrence relation of the Fibnaci sequence of numbers (7)

$fn = fn-1 + fn-2,\ n \geq 2$ with the initial condition $f_0 = 1,\ f_1 = 1$

(b) What is complexity at an algorithm? Differentiate Bighoh and Theta notations. (8)

OR

(P.T.O.)

V. (a) Show that $\lg n! = (\sim)(n \lg n)$ (7)

(b) How many, permutations can be made out of the word 'COMPUTER'? How many of these (i) begin with C ? (8)
(ii) end with R ?
(iii) begin with C and end with R ?

VI. (a) Draw the connected graph represented by the incidence matrix (5)

$$\begin{array}{c} \\ v_1 \\ v_2 \\ v_3 \\ v_4 \end{array} \begin{array}{c} \begin{array}{ccccc} e_1 & e_2 & e_3 & e_4 & e_5 \end{array} \\ \begin{bmatrix} 1 & 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 \end{bmatrix} \end{array}$$

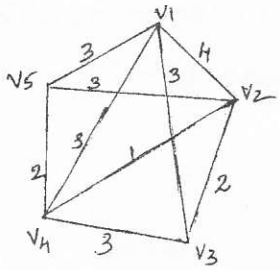
(b) Define Eulers path and Hamiltonian circuit with examples. (5)

(c) Define Complete graph and Regular graph with examples. (5)

OR

VII. (a) Define minimal spanning tree (5)

(b) Find the minimal spanning tree of the weighted graph shown in the figure using Prim's Algorithm (10)



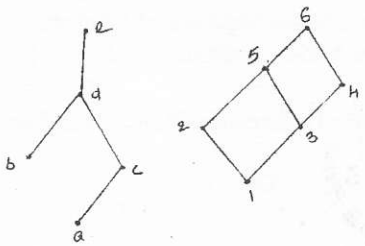
VIII. (a) Consider an algebraic system (Q,∗) where Q is the set of rational numbers and ∗ is a binary operation defined by $a * b = a + b - ab, a, b \in Q$. Determine whether (Q,∗) is a group. (8)

(b) Let $((S,*) \, and \, (T,*^1))$ be monoids with identity e and e_1 respectively. (7)
Let $f : S \to T$ be an isomorphism. Then show that $f(e) = e^1$

OR

IX. (a) Consider the set $D_{50} = \{1,2,5,10,25,50\}$ and $a \le b$ if a divides b. (7)
(i) Draw the Hasse diagram of $(D_{50}, \le)$
(ii) Define all upper bounds of 5 and 10.
(iii) Determine all lower bounds of 5 and 10

(b) Define Lattice. Determine whether the posets shown in the figure one Lattice or not. (8)



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BTS – III – 11.13 – 1193

B.Tech. Degree III Semester Examination November 2013

IT/CS 304 OBJECT ORIENTED PROGRAMMING USING C++

(2006 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 × 5 = 40)

I. (a) Explain benefits of object oriented programming.

(b) Explain different types of inheritance

(c) What is the use of virtual function? Give example.

(d) What are the different techniques used in C++ to achieve polymorphism?

(e) What is late binding?

(f) What is exception and how it is handled in C++?

(g) Explain how member functions and static variable are managed in memory.

(h) Explain:

(i) inline function
(ii) member function
(iii) virtual functions
(iv) recursive function
(v) friend function

PART B

(4 × 15 = 60)

II. (a) Explain features of object oriented programming. (5)

(b) Explain operator overloading with an example. (5)

(c) Explain data hiding with suitable example. (5)

OR

III. (a) Compare procedure programming with object oriented programming. (5)

(b) Explain various control structures (conditional and loop) used in C++. (10)

IV. (a) Define a class matrix having 3 x 3 integer array to hold elements. Overload + operator to add two matrices. Write all necessary member functions. Illustrate C = A + B in the main program area. (10)

(b) Explain the use of constructor and destructor. (5)

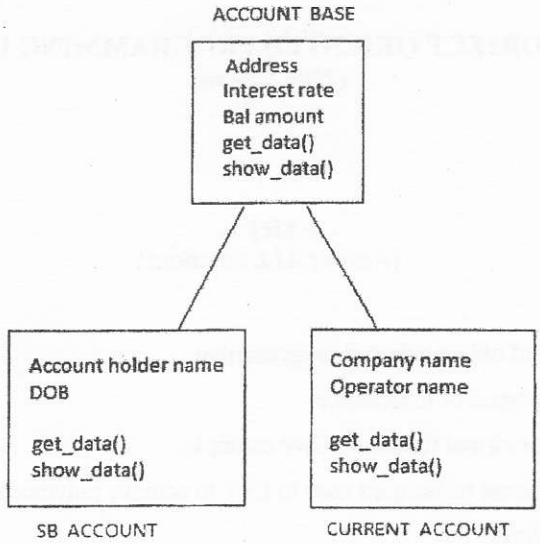
OR

V. Define a class 'String', use constructor for dynamic initialization and destructor to destroy objects. Overload + operator to combine 2 string objects. Overload = = operator to check two string objects are equal or not. Illustrate the string use of operators in the main program. (15)

(P.T.O)

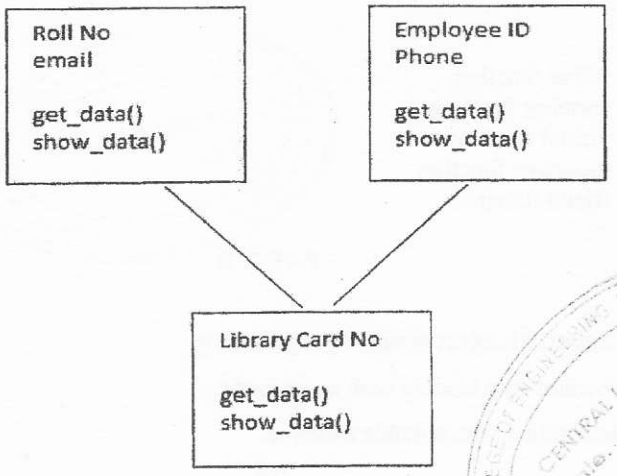
VI. (a) Explain abstract class with example. (5)

(b) Write a C++ program to implement following inheritance. (10)



OR

VII. (a) Write a C++ program to implement the following inheritance. (10)



(b) Explain advantages of inheritance. (5)

VIII. (a) Write a C++ class having following messages to manage text tiles. (10)

(i) Constructor – takes files as parameter and open the file.

(ii) get_char_count()- returns number of characters in the file.

(iii) get_para_count()- returns number of paragraph in the file.

(iv) Convert_to_lower()-convert all characters in to lowercase and store result in file named lw.txt

(b) Explain seekp(), seekg() tellp() and tellg()functions. (5)

OR

IX. (a) Define a class having properties name, reg_no and marks in three. (10)
Subjects-M1, M2 & M3. Write necessary messages to read_data() and display_data(). Using a main program read 20 student records and write the same to disk file. Write another program to read all student records from the file and display mark list (name, reg_no, and total mark).

(b) Explain stream class hierarchy in C++. (5)

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BTS – III – 11.13 – 1208

B.Tech. Degree III Semester Examination November 2013

IT 305 ELECTRONIC CIRCUITS AND LOGIC DESIGN

(2006 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

$(8 \times 5 = 40)$

I. (a) What is the distinct feature of power amplifier compared to voltage amplifier? Describe any one class of power amplifier.

(b) Explain the effect of V_{GS} on drain current I_D for an n-channel FET.

(c) What is the significance of CMRR of an opamp?

(d) Explain a tunnel diode operation with V – I characteristics.

(e) Write on ASCII and EBCDIC.

(f) Compare a multiplexer with an encoder.

(g) Draw a 2-bit asynchronous up counter and explain the working.

(h) Implement conversion of JK flip flop into
(i) D flip flop
(ii) T flip flop

PART B

$(4 \times 15 = 60)$

II. Explain construction and characteristics of FET. (15)

OR

III. (a) Draw the circuit of push-pull amplifier and explain. (10)
(b) Compare positive and negative feedback. (5)

IV. (a) Explain UJT relaxation oscillator. (10)
(b) Draw and explain RC integrator. (5)

OR

V. (a) Draw and explain the block diagram of an opamp. (7)
(b) Comment on drift and offset problems of a practical opamp. (4)
(c) Explain a positive clipper using diode. (4)

VI. (a) Implement basic gates using universal gates. (6)
(b) Design a 4 : 1 multiplexer. (5)
(c) Implement a 3 bit binary to grey code converter. (4)

OR

VII. What is a full adder? Design it using NAND gates only. (15)

VIII. (a) Design a synchronous counter to generate the sequence 0, 2, 4, 6, 0, 2, ... (12)
(b) Explain tristate logic. (3)

OR

IX. (a) What is the significance of asynchronous inputs of a flip flop. (3)
(b) Write a note on ROM classifications. (6)
(c) Implement a 3 bit ring counter. (6)

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B.Tech. Degree III Semester Examination November 2013

IT 306 COMPUTER ORGANISATION

(2006 Scheme)

Time : 3 Hours | Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) Write short note on assembly language.

(b) What is the significance of linkage register in subroutines?

(c) Give the control sequence for the complete execution of the instruction ADD $R_1,(R_2)$.

(d) Write short note on carry look ahead adder.

(e) What is memory interleaving?

(f) What is the significance of replacement algorithm? Explain any one replacement algorithm.

(g) Explain vectored interrupts.

(h) Write short note on USB.

PART B

(4 x 15 = 60)

II. What are addressing modes? Explain different addressing modes with example.

OR

III. Explain the basic internal operational concepts of a computer with neat diagram.

IV. Explain: (i) Hardwired control (ii) Microprogrammed control

OR

V. Explain non restoring integer division with block diagram and example.

VI. Write note on semiconductor RAM memories.

OR

VII. What is virtual memory? Explain paging in detail.

VIII. Write notes on the following I/O interfaces

(i) PCI

(ii) SCSI

OR

IX. Explain DMA in detail.

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