BTS – III – 11.13 – 1162

B. Tech. Degree III Semester Examination November 2013

IT/CS/EC/CE/ME/SE/EB/EI/EE/FT 1301 ENGINEERING MATHEMATICS II

(2012 Scheme)

Time : 3 Hours | Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) Find the rank of the matrix.

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \end{bmatrix}$$

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(b) Check whether the vectors $X_1 = (1,1,2)$, $X_2 = (1,2,5)$ and $X_3 = (5,3,4)$ are linearly dependent or not.

(c) Find the Laplace transform of $t^2\, u(t-3)$

(d) Evaluate $\int_0^\infty \frac{e^{-t} - e^{-3t}}{t} dt$

(e) Find the Fourier sine and cosine integrals of $f(x) = e^{-kx}$, for $x > 0, k > 0$

(f) Express $f(x) = x$ as a Fourier cosine series in $0 < x < 2$

(g) Find the work done by the force $\overline{F} = 3xy\,\overline{i} - y^2\,\overline{j}$ when it moves a particle along the curve $y = 2x^2$ in the xy plane

(h) Find (i) $\nabla^2\left(\frac{1}{r}\right)$ where $r = |\overline{r}|$ and (ii) $\nabla\left(\frac{1}{r}\,\overline{r}\right)$

PART B

(4 x 15 = 60)

II. (a) Test for consistency of the following system of equations and solve them if consistent: (8)

$$x_1 + x_2 - x_3 = 0$$
$$2x_1 - x_2 + x_3 = 3$$
$$4x_1 + 2x_2 - 2x_3 = 2$$

(b) Verify Cayley Hamilton theorem and hence find A^4 (7)

$$A = \begin{bmatrix} 2 & -1 & 2 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

OR

(P.T.O.)

III. (a) For what values of k the equations $x+y+z=1, 2x+y+4z=k$, $4x+y+10z=k^2$ have a solution and solve them completely in each case. (10)

(b) Check whether $W=\{(a,b,o): a=b^2, a,b,\in R\}$ is a subspace or not (5)

IV. Find the inverse Laplace transform of

(i) $\dfrac{5S+3}{(S-1)(S^2+2S+5)}$ (5)

(ii) $\tan^{-1}\left(\dfrac{2}{S}\right)$ (5)

(iii) $\log\left(\dfrac{1+S}{S}\right)$ (5)

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OR

V. (a) Solve the equation : $y^{11}-3y^{1}+2y=4t+e^{3t}$ when $y(0)=1$, $y^{1}(0)=-1$ (8)

(b) Apply convolution theorem to evaluate $L^{-1}\left\{\dfrac{1}{S(S^2+4)}\right\}$ (7)

VI. (a) Find the Fourier transform of e^{-x^2} (8)

(b) Solve the integral equation:

$$\int_0^\infty F(x)Cos\,px\,dx=\begin{cases}1-p & 0\le p\le 1\\ 0 & p>1\end{cases}$$ (7)

OR

VII. (a) Obtain the Fourier series for the function $f(x)=x^2, -\pi<x<\pi$. Hence show that (10)

(i) $1+\dfrac{1}{2^2}+\dfrac{1}{3^2}+.....=\dfrac{\pi^2}{6}$

(ii) $1-\dfrac{1}{2^2}+\dfrac{1}{3^2}-\dfrac{1}{4^2}+.....=\dfrac{\pi^2}{12}$

(iii) $1+\dfrac{1}{3^2}+\dfrac{1}{5^2}+.....=\dfrac{\pi^2}{8}$

(b) Find the finite Fourier Sine transform of $f(x)=2x\ in\ 0<x<4$ (5)

VIII. (a) Verify divergence theorem for $\overline{F}=x^2\overline{i}+z\overline{j}+yz\overline{k}$ over the cube formed by $x=\pm1, y=\pm1, z=\pm1$ (9)

(b) Prove that $\nabla.(\nabla x\,\overline{A})=0$ for any vector function $\overline{A}$ (6)

OR

IX. (a) Verify Stoke's theorem for $\overline{F}=(2x-y)\overline{i}-yz^2\overline{j}-y^2z\overline{k}$ where S is the upper half of the sphere $x^2+y^2+z^2=1$ and C is the circular boundary in the XY plane. (8)

(b) Show that $\overline{F}=(y^2+2xz^2)i+(2xy-z)\overline{j}+(2x^2z-y+2z)\overline{k}$ is irrotational and hence find its scalar potential. (7)

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BTS – III – 11.13 – 1164

B. Tech. Degree III Semester Examination November 2013

IT/ME 1302 ELECTRICAL TECHNOLOGY

(2012 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) Derive the emf equation of a transformer.

(b) What do you mean by CT and PT? Where are they used?

(c) Explain the conditions for voltage build up of a self excited DC shunt generator.

(d) Explain the significance of back emf in a dc motor.

(e) Explain how the torque is developed in a rotor of 3ϕ induction motor.

(f) Explain the different methods of starting synchronous motors.

(g) List the various electrical equipments used in power stations.

(h) Discuss the advantage of high voltage transmission.

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PART B

(4 x 15 = 60)

II. The following readings were obtained from OC and SC tests on 3KVA, 220V/110V, 50Hz transformer. (15)

OC test (lv side : 110V, 0.9A, 38W

SC test (hv side) : 15V, 13.6A, 45W

Calculate:

(i) the equivalent circuit constants w.r.t. HV side

(ii) voltage regulation and efficiency for 0.8 lagging power factor load.

(iii) The efficiency at half full load and 0.8 pf load.

OR

III. (a) Draw and explain the no load phasor diagram of a single phase transformer (5)

(b) A transformer rated for 10KVA, 2000V/200V, 50Hz when tested took 200W on OC test at rated voltage and 250W on SC test with full load current circulated in the windings. Determine the efficiency at full load, 0.8 pf lagging and the KVA loading to give maximum efficiency at upf. (10)

IV. (a) Derive the emf equation of a generator (5)

(b) A shunt motor takes an armature current of 50A at 250V when running on full load, at a speed of 800 rpm. The armature resistance is $0.2\,\Omega$. If the field strength is reduced by 10% and the torque remains the same, determine the steady speed attained and the armature current. (10)

OR

(P.T.O.)

V. (a) Explain the effect of armature reaction. How is it compensated? (7)

(b) A dc shunt generator is having 600 wave connected conductors. The flux per pole is 0.06wb and the machine is having 6 poles. The armature is rotating at a speed of 900rpm. The armature resistance is $0.05\,\Omega$, field circuit resistance is $100\,\Omega$. Calculate the output of the generator if the terminal voltage is 1550V. (8)

VI. (a) Define voltage regulation of an alternator. Explain the EMF method of finding voltage regulation. (7)

(b) A three phase 16 pole alternator has a star connected winding with 144 slots and 10 conductors/slot. The flux/pole is 0.03 wb sinusoidally distributed and the speed is 375 rpm, find the frequency, the phase and line emf. Assume full pitched coil. (8)

OR

VII. A 6 pole 50Hz 3ϕ induction motor running on full load with 3% slip develops a torque of 160Nm at its pulley rim. The friction and windage losses are 210W and stator copper and iron losses equal to 1640W. Calculate. (15)
(i) Rotor slip (ii) Efficiency at Full load (iii) Rotor Cu loss

VIII. Explain the working of thermal power plant with the help of neat schematic diagram (15)

OR

IX. (a) What is corona? What are the factors affecting corona? (7)

(b) Explain hydroelectric power generation with neat sketch. (8)

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B.Tech. Degree III Semester Examination November 2013

CS/IT 1303 DISCRETE COMPUTATIONAL STRUCTURES

(2012 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) Define tautology and contradiction with an example.

(b) State De-Morgan's Law for logic.

(c) Write an algorithm to find the maximum of a finite sequence of numbers.

(d) State Pigeohole principle with an example.

(e) Write a note on travelling salesman problem in graph theory.

(f) Define minimal spanning tree.

(g) Consider an algebraic system $(G,*)$ where G is the set of all non-zero real numbers and $*$ is a binary operation defined by $a*b=\frac{ab}{2}$. Show that $(G,*)$ is an abelian group.

(h) Define semigroup and lattice.

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PART B

(4 x 15 = 60)

II. (a) Prove that $(p \to q) \leftrightarrow (\upsilon p) v\ q$ is a tautology. (7)

(b) By mathematical induction, prove that (8)

$$1^3+2^3+....+n^3=\left[\frac{n(n+1)}{2}\right]^2$$

OR

III. (a) Determine whether the given arguments are valid or not. (7)

(*i*) $p \to q$, p, $\therefore q$ (*ii*) $p \to q$, q, $\therefore p$

(b) Consider f, g and h, all functions on the integers by (8)

$f(n)=n^2$, $g(n)=n+1$ and $h(n)=n-1$. Determine: (i) hofog (ii) gofoh (iii) fogoh

IV. (a) Solve the recurrence relation $2a_r-5a_{r-1}+2a_{r-2}=0$ with initial condition $a_0=0$ and $a_1=1$ (10)

(b) From a club consisting of 4 men and 6 women, in how many ways we can select a committee of 3 men and 4 women. (5)

OR

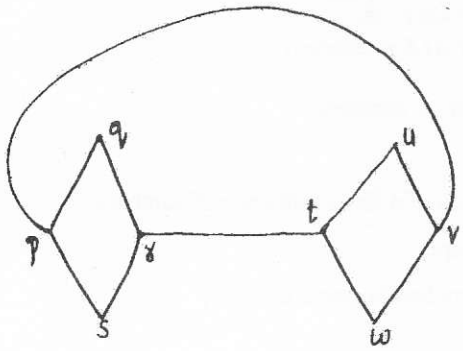
V. (a) Define recursive algorithm and explain the recursive algorithm for finding the factorial of n. (7)

(b) Solve recurrence relation $a_r-4a_{r-1}+4a_{r-2}=0$ with initial condition $a_0=1$ and $a_1=6$ (8)

(P.T.O.)

VI. (a) Prove that the sum of degree of all the vertices in a graph G, is even. (5)

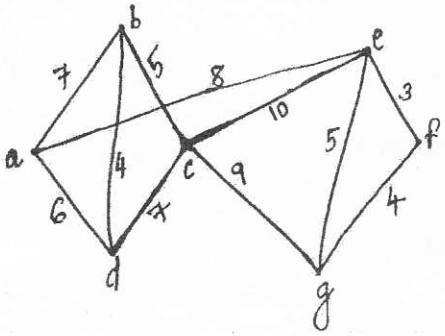
(b) Use Fleury's algorithm to find an Euler cycle in the following graph. (10)



OR

VII. (a) Prove that in any graph, there are an even number of vertices of odd degree. (5)

(b) Apply Kruskal's algorithm to find minimal spanning tree of the following graph (10)



VIII. (a) Let $A\{a,b\}$, which of the following tables defines a semigroup on A? Which define monoid on A? (10)

(i)

*	a	b
a	a	b
b	a	a

(ii)

*	a	b
a	a	b
b	b	a

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(b) Let $(A,*)$ be a semigroup. For every a, b in A, (5)
if $a \neq b$ then $a*b \neq b*a$ and $a*a = a$

(i) show that for every a,b in A, $a*b*a = a$

(ii) show that for every a,b,c in A, $a*b*c = a*c$

OR

IX. Let $D_{100} = \{1, 2, 4, 5, 10, 20, 25, 50, 100\}$ and let the relation be 'the divides', be a partial ordering on D_{100}. Draw the Hasse Diagram. (15)

(i) Determine the GLB and LUB of B, where $B = \{5, 10, 20, 25\}$

(ii) Determine the GLB and LUB of B, where $B = \{10, 20\}$

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B.Tech. Degree III Semester Examination November 2013

CS/IT 1304 OBJECT ORIENTED PROGRAMMING

(2012 Scheme)

Time : 3 Hours | Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) Is C++ a better language? Justify.
(b) Why do we need function declaration in a programme?
(c) What is function overloading? Give an example.
(d) Differentiate class and object with an example.
(e) Draw the pictorial representation of different types of inheritance provided by C++.
(f) What is an abstract class? Are they useful in object oriented software development?
(g) What is binding? Define static and dynamic binding.
(h) What is an exception? Write the syntax of exception handling code in C++. Explain the keywords used and the working.

PART B

(4 x 15 = 60)

II. Explain the key concepts of object oriented programming.. (15)

OR

III. What is the purpose of functions in a programme? Differentiate between function definition, function declaration and function call with a suitable C++ code. How are member functions defined in a C++ class? (15)

IV. Design the following classes with suitable data members and member functions (5 x 3 = 15)

(i) Student
(ii) Employee
(iii) Bank account
(iv) Library book
(v) Text file

[Draw the UML notation for classes and write the corresponding C++ code, for each class]

OR

V. Write a menu-driven programme in C++ with suitable class and members, to find the sum of the specified row or column of a matrix of size $n \times m$. If the matrix is square find the sum of the specified diagonal also. (15)

VI. Write short notes on: (3 x 5 = 15)

(i) Virtual base class
(ii) 'New' and 'delete' operators
(iii) Array of printers and pointer to array

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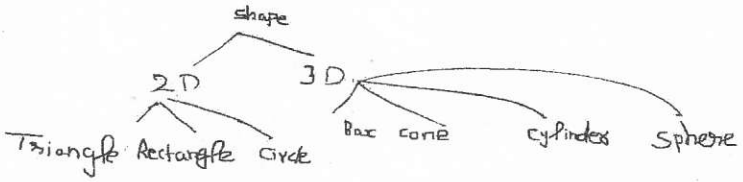
OR

VII. (a) How is the concept of 'data hiding' implemented in C++? Give an example. (5)
(b) Implement the following class hierarchy in C++. (10)



VIII. Write short notes on: (3 x 5 = 15)

(i) Templates
(ii) Virtual functions
(iii) 'String' class in C++

OR

IX. Assume there exists a text file "lang. txt" with content "C++ is a beautiful language". Write a C++ programme to append the text "But many students find it difficult to learn and programme in it" to this file. After appending the text, display the entire file in forward and reverse order. (15)

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BTS – III – 11.13 – 1209

B.Tech. Degree III Semester Examination November 2013

IT 1305 COMPUTER ORGANIZATION

(2012 Scheme)

Time: 3 Hours

Maximum Marks: 100

PART A

(Answer *ALL* questions)

$(8 \times 5 = 40)$

I. (a) What is a stack? Explain the stack operations with example.

(b) Briefly explain the bus structure of a computer.

(c) Write down the procedure for fetching a word from memory with a suitable example.

(d) Explain the following:
(i) Prefetching (ii) Emulation

(e) Draw the internal organization of a static RAM cell and explain its read and write operations.

(f) Explain the principle of locality of reference? Differentiate temporal and spatial locality.

(g) Differentiate between memory mapped I/O and I/O mapped I/O.

(h) Explain direct memory access.

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PART B

$(4 \times 15 = 60)$

II. What is an addressing mode? Explain with typical examples, the different addressing modes available in commercial computers. (15)

OR

III. (a) What is a straight-line sequencing? Explain the execution of a branch instruction. (10)

(b) What is a subroutine? Explain with an example. (5)

IV. (a) Write the control sequence for execution of the instruction Add (R3), R1. (5)

(b) Draw and explain hardwired control unit organization. (10)

OR

V. Explain wide branch addressing with an example. (15)

VI. What is memory mapping? Explain different memory mapping techniques? (15)

OR

VII. (a) Explain how you can improve the performance of the main memory using interleaving techniques. (5)

(b) What is virtual memory? Explain with diagram how address translation is taking place in it. (10)

VIII. (a) Explain interrupt handling using daisy chain method. (7)

(b) Explain the following: (8)

(i) vectored interrupts (ii) interrupt nesting

OR

IX. Explain various standard I/O interfaces used in a digital computer. (15)

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BTS – III– 11.13 – 1227

B.Tech. Degree III Semester Examination November 2013

IT 1306 LOGIC DESIGN AND ELECTRONIC CIRCUITS

(2012 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) Define weighted and non weighted code with example.

(b) Convert the following:

(i) $(1762.46)_8 \rightarrow (\ )_{16}$

(ii) $(3956)_{10} \rightarrow (\ )_8$

(iii) $(4BAC)_{16} \rightarrow (\ )_2$

(iv) $(011101.110)_2 \rightarrow (\ )_{10}$

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(c) What do you mean by 'race around condition'? Define two different methods to overcome race around problem.

(d) Define shift registers. What are the applications?

(e) Compare positive and negative feedback.

(f) Explain the amplification of CE transistor amplifier.

(g) Describe the working of clamping circuit with sinusoidal input.

(h) Write short notes on differentiating and integrating circuits.

PART B

(4 x 15 = 60)

II. (a) Draw and explain the truth table of a full adder, with the help of its circuit realised using only NAND gates. (10)

(b) Explain binary multiplier with example. (5)

OR

III. (a) Reduce the given expression using k – map (10)

$y = \sum m(9,10,12) + d(3,5,6,7,11,13,14,15)$.

Realize the simplified expression using NOR gates only.

(b) Design 4 : 1 multiplexer using gates. (5)

IV. (a) Design asynchronous BCD up counter with the help of waveforms. (10)

(b) Draw and explain the circuit of (5)

(i) CMOS to TTL interface

(ii) TTL to CMOS interface

OR

V. (a) Explain a typical TTL NAND gate with a circuit diagram. (9)

(b) Compare synchronous and asynchronous counter. (6)

VI. (a) Explain construction and characteristics of JFET. (9)

(b) Discuss about class B push pull amplifier. (6)

OR

VII. Explain low, medium, high frequency analysis and design of RC coupled amplifier. (15)

VIII. (a) Explain the working of SCR with necessary diagram and graph. (10)

(b) Explain clipping circuits. (5)

OR

IX. Explain the working of UJT with its VI characteristics. (15)

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