(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY- JUNE 2017

Paper Code: ETCS-204 ***Subject: Computer Organization and Architecture***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt all questions as directed. Internal choice is indicated.

Q1 (a) Differentiate between "hit" and "miss" with respect to cache memory. **(2.5x10=25)**
(b) How interrupts are handled? Explain.
(c) Explain little endian and big endian data storage machanisms.
(d) Express A*B+*(B*D+C*E) into reverse polish notation.
(e) Differentiate between direct and indirect instruction.
(f) Briefly list the types of interrupts with the help of suitable examples.
(g) Differentiate between RISC and CISC.
(h) Explain updating techniques used in cache design.
(i) Explain Virtual memory. Also state "Locality of Reference" principle.
(j) What are the different kinds of operation used in CPU design?

Q2 (a) Starting from an initial value R=11011101, determine the sequence of binary values in R after a logical shift left, followed by a circular shift right, followed by a logical shift right and a circular shift. **(4)**
(b) Draw an explain bus system for four registers. Also represent the conditional statement by two register transfer statements with control functions.
If(P=1)then (R→R2)else if (Q=1) then (R1←R3) **(6)**
(c) Define the term Micro-operation and micrco instruction with the help of an example.**(2.5)**

OR

Q3 (a) Convert the decimal 61.5867 into its binary equivalent. **(2)**
(b) Convert -6.75 (written in decimal) to floating point representation (single precision).**(4)**
(c) What do you mean by bus arbitration? Explain serial and parallel bus arbitration in detail. **(6.5)**

Q4 (a) Explain instruction cycle(fetch) and (decode) in detail. Also explain the working of computer registers used in it. **(6.5)**
(b) Draw an array multiplier circuit that multiplies a binary number of 4 bits with a number of 3 bits. **(3)**
(c) For the expression X=(A+B)*(C+D) when evaluated on stack machine how many number of machine instructions are required? **(3)**

OR

Q5 (a) What are different types of flags used in 8085 microprocessor? On what architecture is 8085 based? Explain. **(6.5)**
(b) Consider the following program segment used to execute on a hypothetical machine instructors are: Inst 1, Inst2, Inst3, Inst3, Inst5, Inst6, Inst7
Size(in words): 2,1,1,2,1,2,1 respectively. **(6)**
Assume the word size of the instruction is 32 bit and the program has been loaded into the memory with starting address of 1000(decimal onwards). What could be the value present in PC during the execution of Inst6. (Memory byte addressable).

Q6 (a) Explain instruction formats with examples. **(6)**
(b) Consider a hypothetical processor which supports expand opcode technique. A 32 bit instruction is place in 256MW memory. If there exist 10, one address instruction then how many zero-address instruction are possible. **(6.5)**

OR

Q7 (a) Differentiate between hardwired control and micro programmed control. Is it possible to have a hardwired control associated with a control memory? **(6.5)**
(b) Explain various memory based addressing modes in detail with the help of suitable diagram. **(6)**

P.T.O.

Q8 (a) Define DMA. Explain its need. Explain DMA transfer in detail with the help of suitable diagram. **(7.5)**

(b) Main memory size is 128 KB, cache size is 16 KB, block size is 256B. Using direct bit mapping what is the no of tags bits in physical address and what is the size of tag directory. Assume memory is byte addressable. **(5)**

OR

Q9 Write short notes on:-

(a) Types of interrupt & Memory hierarchy **(6.5)**

(b) Serial communication & RS-232-C. **(6)**

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(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

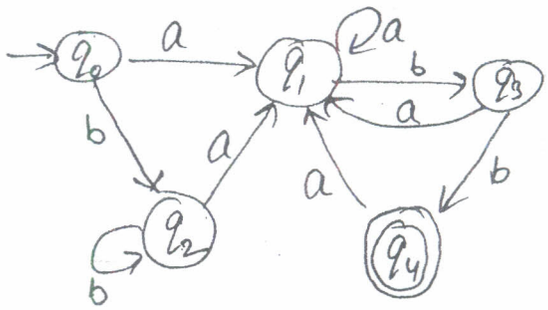
FOURTH SEMESTER [B.TECH] MAY- JUNE 2017

Paper Code: ETCS-206	*Subject: Theory of Computation*
Time: 3 Hours	*Maximum Marks: 75*

Note: Attempt all question as directed. Internal choice is indicated.

Q1 (a) Explain deterministic and non deterministic automata with example. **(5x5=25)**
(b) State and prove Pumping Lemma for regular languages.
(c) Differentiate between Chomsky Normal Form and Greibach Normal Form.
(d) Construct a Turing Machine M to accept the set L of all string over {0,1} ending with 010.
(e) State and prove Savitch Theorem.

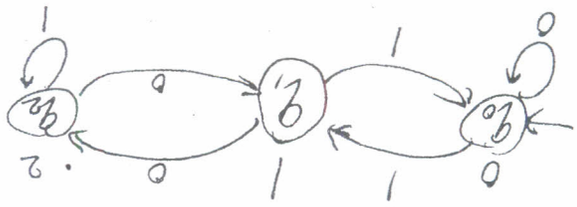
Q2 (a) Design a minimum state automation for the following DFA. **(6.5)**



(b) Prove that i. a*(ab)*(a*(ab)*(a*(ab)*)*=(a+ab)*
ii. (1+00*1)+(1+00*1) (0+10*1)*(0+10)*1)=(0+10*1)* **(6)**

OR

Q3 (a) Convert the following Moore Machine to its equivalent Mealy Machine. **(6.5)**



(b) Prove that if L_1 & L_2 are context free languages, then $L=L_1 \cup L_2$ is also context free. **(6)**

Q4 (a) Convert the following grammar G to Chomsky Normal Form:- **(6)**
S→ABCa,A→aAbb, A→e,B→bB,B→b,B→AC,C→aCa,C→e
(b) Prove that intersection of a CFL L with a regular language M is a CFL. **(6.5)**

OR

Q5 (a) Prove that class of deterministic context free languages is closed under complement. **(6.5)**
(b) Check whether the following grammar is ambiguous. If it is ambiguous remove the ambiguity and write an equivalent unambiguous grammar. S→I C t S | iC t S e S|a,C→b. **(6)**

Q6 (a) Construct a turning Machine for checking if a set of parenthesis is well-formed. **(6)**
(b) Define Turning Machine. Give a block diagram with specified functions of each part of it. What is the difference between a Turning Machine and Two way finite Automata? **(6.5)**

P.T.O.

ETCS-206

P1/2

OR

Q7 (a) State and prove Halting Problem for Turning machine. **(6.5)**

(b) Design a Turning Machine to accept the language $L=\{a^n b^n, n>1\}$. Show an ID for the string 'aaabbb' with tape symbols. **(6)**

Q8 Write short notes on **any two:-** **(6.25x2=12.5)**

(a) Prove that a function $f:\Sigma^* \rightarrow \Sigma^*$ is called polynomial-time computable if there is a polynomially bounded Turning Machine computing it.

(b) Explain classification of problems with example.

(c) State & prove Cook's Theorem

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(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY- JUNE 2017

Paper Code: ETCS-208 ***Subject: Database Management System***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions including Q.No1 which is compulsory.

Q1 Answer the following questions in brief:- **(2.5x10=25)**

(a) List the role of Database Administrator?
(b) What are the types of mapping constraints?
(c) What are the types of Data Independence?
(d) Explain difference between a weak and a strong entity set?
(e) What is the need of Normalization?
(f) What are ACID properties? Explain in brief.
(g) Explain the Thomas Write Rule?
(h) What are Dense and Sparse Indices?
(i) What are Multi valued Dependency? Explain.
(j) What are DDL, DML and DCL commands? Explain.

Q2 (a) Give the relational schemas: **(2x5=10)**

ENROLL(S#,C#SECTION)
TEACH(PROF, C#, SECTION)
ADVISE(PROF, S#)
PRE-REQ(C#,PRE-C#)
GRADES(S#,C#,GRADE, YEAR)
STUDENT(S#,SNAME)
(Where, S#=student number, C#=course)

Give Queries expressed in SQL:

(i) List the students taking course with Smith or Jones.
(ii) List all students taking atleast one course that their advisor teaches.
(iii) List those professors who teach more than one section of the same course.
(iv) List all student's number and course number.
(v) List the student number and course number who got grade A.

(b) What are Canonical Covers? Explain. **(2.5)**

Q3 (a) Construct an E-R diagram for a car-insurance company that has a set of customers, each of whom owns one or more cars. Each car has an associated number indicating the number of recorded accidents. **(10)**

(b) Explain the difference between primary key, super key and candidate key? **(2.5)**

Q4 (a) Given two sets F1 and F2 of FD's for a relation- **(5)**

F1:A→B,AB→C,D→AC,D→E
F2:A→BC,D→AE
Are the two sets equivalent?

(b) Consider the universal relation R={A,B,C,D,E,F,G,H,I,J} and set of FDs
F=AB→C,A→DE,B→F,F→GH,D→IJ
What is the key for R? Decompose R into 3NF. **(7.5)**

Q5 (a) What are recoverable and cascadeless schedules? Explain. **(5)**

(b) What do you understand by lock compatibility? Discuss in detail with example? **(7.5)**

Q6 (a) Discuss the basic time stamp ordering protocol? Also explain the values associated with the timestamps? **(7.5)**

(b) Discuss the "Wait-die" and "wound-wait" techniques of deadlock prevention. **(5)**

P.T.O

Q7 (a) Explain Check points. How does it helps in reducing the amount of time required during Recovery? Also discuss the concept of fuzzy check pointing? **(6.5)**

(b) What do you mean by Query processing? What are the various steps involved in Query Processing? Explain with the help of a block diagram. **(6)**

Q8 Write Short notes on:- **(2.5x5=12.5)**

(a) Database Tuning
(b) B+Tree Index File
(c) Join dependency
(d) PL/SQL concept
(e) Relational Algebra

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(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY- JUNE 2017

Paper Code: ETCS-210 ***Subject: Object Oriented Programming***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions including Q.No1 which is compulsory.

Q1 Attempt the following:- **(2.5x10=25)**

(a) Differentiate between pointer and reference variables.
(b) What are empty classes? Can instances of empty class be created?
(c) Differentiate between default and parameterized constructors.
(d) What is Garbage Collection in C++.
(e) Why are virtual functions used?
(f) What is containership? Explain with an example.
(g) Define static objects with example.
(h) How constructors and destructors are executed in multilevel inheritance.
(i) Define Reusability, how C++ supports Reusability?
(j) Differentiate function overloading and function overriding.

Q2 (a) Explain the characteristics of Object-oriented language, with appropriate examples. **(8)**
(b) Explain the use of copy constructor with example program. **(4.5)**

Q3 (a) Write a program to show the use of friend function and friend class. **(7.5)**
(b) What are Destructors? Write a program to show the order in which local objects are destructed. **(5)**

Q4 (a) Create a class, which keeps track of the number of its instances, use static data member, constructors and destructors to maintain updated information about active objects. **(7.5)**
(b) How to achieve dynamic memory allocation in C++? Explain with a program. **(5)**

Q5 (a) How base class member functions can be involved in a derived class if the derived class also has member function with the same name? Explain with example. **(8.5)**
(b) Differentiate public, protected and private access specifiers. **(4)**

Q6 (a) What is generic programming? Write its advantages? **(5)**
(b) What is the difference between C & C++. Show & explain the usage of new & delete keyword. **(4+3.5=7.5)**

Q7 (a) What are Abstract classes? **(3)**
(b) Write a program having STUDENT as an abstract class and create many derived classes such as ENGINEERING, SCIENCE, MEDICAL, etc. from the STUDENT class. Create their objects and process them. **(9.5)**

Q8 (a) What are exceptions? How reliability is affected by exception handling? **(4)**
(b) Write an interactive program to compute the square root of a number. The input value must be tested for validity. If it is negative, the user defined function my_sqrt() should raise an exception. **(8.5)**

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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2017

Paper Code: ETMA 202 **Subject: Applied Mathematics-IV**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.No. 1 which is compulsory. Select one question from each unit.

Q1. a) Solve $4\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}=3u$, given u= $3e^{-y}$ -e^{-5y} when x=0, by the method of separation of variables. **(3)**

b) Define the skewness and kurtosis. Also write their coefficients. **(3)**

c) Determine the Bionomial Distribution for which mean=2 (Variance) and mean+ Variance=3. Also find P(X≤3). **(4)**

d) The first four moments of a distribution about the value '0' are -0.20, 1.76, -2.36 and 10.88. Find the moments about the mean. **(4)**

e) State Baye's theorem. **(3)**

f) The standard weight of a special purpose brick is 5 kg. and it contains two basic ingredients B_1 and B_2. B_1 cost Rs. 5 per kg. and B2 cost Rs. 8 per kg. Strength considerations state that the brick contains not more than 4 kg. of B_1 and minimum of 2 kg of B_2. Since the demand for the product is likely to be related to the price of the brick, find out graphically minimum cost of the brick satisfying the above conditions. **(5)**

g) Find the dual of the following primal problem:
Min. Z =$3x_1-2x_2+4x_3$, subject to: $3x_1+5x_2+4x_3 \geq 7$, $6x_1+x_2+3x_3 \geq 4$, $7x_1-2x_2-x_3 \leq 10$, and $x_1, x_2, x_3 \geq 0$. **(3)**

Unit-I

Q2. a) $(D^2 - DD' - 2D'^2)z = (y-1)e^x$. **(6.5)**

b) $(D^2 - DD' + D')z = x^2 + y^2$. **(6)**

Q3. a) An insulated rod of length l has its end A and B maintained at 0°C and 100°C respectively until steady state conditions prevail. If B is suddenly reduced to 0°C and maintained at 0°C, find the temperature at a distance x from A at time t. **(6.5)**

b) Solve the above problem if the change consists of raising the temperature of A to 20°C and reducing that of B to 80°C. **(6)**

Unit-II

Q4. a) Three balls are drawn successively from a box containing 6 red balls, 4 white balls, and 5 blue balls. Find the probability that they are drawn in the order red, white and blue if each ball is i) replaced and ii) not replaced. **(6.5)**

b) Find i) E(X), ii) $E(X^2)$, iii) $E[(X-X)^2]$ for the probability distribution shown in the following table: **(6)**

X	8	12	16	202	24
p(X)	1/8	1/6	3/8	¼	1/12

P.T.O.

ETMA-202
P1/3

Q5. a) A continuous distribution of a variable x in the range (-3,3) is defined as

$$f(x) = \frac{1}{16}(3+x)^2 \quad , -3 \le x < -1,$$

$$= \frac{1}{16}(2-6x^2), \quad -1 \le x < 1,$$

$$= \frac{1}{16}(3-x)^2, \quad 1 \le x \le 3.$$

Verify that the area under the curve is unity. Show that the mean is zero. **(6)**

b) If the heights of 300 students are normally distributed with mean 68.0 inch and standard deviation 3.0 inch, how many students have heights. i) greater than 72 inch. ii) between 65 and 71 inch. **(6.5)**

Unit-III

Q6. a) Fit a second degree parabola to the following data using method of least squares. **(6.5)**

X	10	12	15	23	20
Y	14	17	23	25	21

b) For 10 observations on price (x) and supply (y), the following data were obtained $\Sigma x=130$, $\Sigma y=220$, $\Sigma x^2=2288$, $\Sigma y^2=5506$, $\Sigma xy=3467$. **(6)**

Obtained the two lines of regression, correlation coefficient and estimate the supply when the price is 16 units.

Q7. a) A group of 10 rats fed on a diet A and another group of 8 rats fed on a different diet B, recorded the following increase in weight: **(6.5)**

Diet A (gm.)	5	6	8	1	12	4	3	9	6	10
Diet B (gm.)	2	3	6	8	10	1	2	8	-	-

Does it show that superiority of diet A over that of B.

b) Fit a Poisson distribution to the following data and test for its goodness of fit at 0.05 level of significance. **(6)**

X:	0	1	2	3	4
F:	419	352	154	56	19

Unit-IV

Q8. Use penalty (or Big-M) method to solve the problem:
Max.$z= 6x_1+4x_2$ subject to $2x_1+3x_2 \le 30$, $3x_1+2x_2 \le 24$, $x_1+x_2 \ge 3$, and $x_1, x_2 \ge 0$.
Is the solution is unique? If not, give two different solutions. **(12.5)**

P.T.O.

Q9. a) A method Engineer wants to assign four new methods to three work centers. The assignment of the new methods will increase production and they are given below. If only one method can be assigned to a work center, determine the optimum assignment. **(6)**

Increase in Production (unit)

Methods	Works Centers		
	A	B	C
1	10	7	8
2	8	9	7
3	7	12	6
4	10	10	8

b) Solve the following Transportation problem: **(6.5)**

Suppliers / Consumers	A	B	C	Available
I	6	8	4	14
II	4	9	8	12
II	1	2	6	5
Required	6	10	15	31

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(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY- JUNE 2016

Paper Code: ETCS-204	*Subject: Computer Organization & Architecture*
Time: 3 Hours	*Maximum Marks: 75*

Note: Attempt any five questions including Q.No1 which is compulsory.

Q1 Attempt all:
(a) Differentiate between Micro-operation and Macro operation. **(5)**
(b) Differentiate between access time and cycle time of a memory. **(5)**
(c) Differentiate between Hardwired and Micro Programmed control unit. **(5)**
(d) Differentiate between Asynchronous Data Transfers and synchronous data transfer. **(5)**
(e) Differentiate between Unsigned notation and, signed notation. Find range of 2 byte integer in both cases **(5)**

Q2 (a) What is RS 232-C standard? Explain the signals associated with it. **(6)**
(b) What are the advantages of byte addressing mechanism over word addressing mechanism and what are their disadvantages? **(6.5)**

Q3 Discuss different addressing modes used in computer systems using examples. **(12.5)**

Q4 (a) Explain zero-address, one-address and two-address instructions with examples. **(6)**
(b) Explain the need of memory hierarchy with the help of a block diagram? What is the reason for not having one large memory unit for storing all information at one place? **(6.5)**

Q5 The 8-bit registers A, B, C & D are loaded with the value $(F2)_H$, $(B9)_H$ and $(EA)_H$ respectively. Determine the register content after the execution of the following sequence of micro-operations sequentially. Where Shl=shift left.shr=shift right and cir=circular. **(12.5)**
(i) A←A+B, C←C+shl(d)
(ii) C←C+D,B←B+1
(iii) A←A-C
(iv) A←shr(B)⊕cir(d)

Q6 (a) Explain 8085 instruction set architecture and its organization in detail. **(6.5)**
(b) Discuss about Input-Output and Interrupts in detail. **(6)**

Q7 (a) Discuss the procedure to implements a simple CPU. **(6)**
(b) Starting from an initial value of R=10011101. Determine the sequence of binary values in R after logical shift left, followed by a circular shift-right followed by a logical shift right and a circular shift left. **(6.5)**

Q8 Write short notes on **any two** of the following:- **(6.25x2=12.5)**
(a) Bus Architecture and Bus Arbitration
(b) Levels of programming languages
(c) RS-232-C and RS-422 standard

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(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2016

Paper Code: ETCS 206 ***Subject: Theory of Computation***

Time : 3 Hours ***Maximum Marks :75***

Note: Attempt any five questions including Q. No. 1 which is compulsory. Assume missing data if any.

Q1. a) Differentiate between DFA and NFA. **(5x5=25)**
b) What is Ambiguity? How it is removed?
c) Define Recursively Enumerable Language. What are its Different Properties?
d) Differentiate between NP-Hard and NP-Compare Problem.
e) Differentiate between Moore Machine and Mealy Machine

Q2. a) Briefly explain Chomsky classification of languages. with examples. **(8)**
b) Draw a DFA for all strings over {0,1} consisting of even no of 0's and even no of 1's. **(4.5)**

Q3. a) State and prove Pumping Lemma for Regular Languages. Also prove that language L= $\{a^n b^n$ for n=0,1,2,3.....$\}$ is not regular. **(8)**
b) Find a Regular Expression corresponding to each of the following subset[0,1]: **(4.5)**
i) The language of all strings containing atleast two 0's.
ii) The language of all strings Containing atmost two 0's.

Q4. a) Consider the CFG whose Productions are **(6.25)**

$S \rightarrow bB/aA$
$A \rightarrow b/bS/aAA$
$B \rightarrow a/aS/bBB$ for the string bbaababa. Find.

i) Left Most Derivation
ii) Right Most Derivation
iii) Parse Tree

b) What is PDA? Construct a PDA accepting the set of all strings over {a,b} with equal no. of a's and b's. **(6.25)**

Q5. a) What are the different closure properties of CFL? Explain with proof. **(7)**
b) State Pumping lemma for CFL. Provide an example to understand. **(5.5)**

Q6. a) State & explain Halting Problem. **(6.5)**
b) What is Turning Machine? What are it's different variant? Explain. **(6)**

Q7. a) State and prove Savitch's Theorem. **(6)**
b) Briefly explain Cook's Theorem. **(6.5)**

Q8. Write short notes on **any two**: **(6.25x2=12.5)**
a) Space & Time Complexity
b) Turing Church's Thesis
c) Chomsky Normal form

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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH.] MAY-JUNE 2016

Paper Code: ETCS-208 ***Subject: Database Management System***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions including Q no.1 which is compulsory.

Q1 Define the following (Give example where necessary):- **(10x2.5=25)**

(a) Multivalued dependency
(b) Dependency preservation
(c) Functional dependency
(d) Referential integrity
(e) Internal schema
(f) Candidate key
(g) Triggers
(h) DBA
(i) Weak entity
(j) Foreign key

Q2 (a) Differentiate between the term Generalization and Specialization with example. **(6.5)**
(b) Differentiate between Fragmentation, Replication and Transparency. **(6)**

Q3 (a) Define closure of FD set. For the following relation
R (A, B, C, D)
With FDs as follows:-
(i) AB→ C
C→ A
BC→ D
ACD→ D
D→ EG
BE→ C
CG→ BD
CE→ AC
Find the closure of (B, D) and (C, A). **(6.5)**
(b) What is canonical cover? How it is computed? **(6)**

Q4 (a) Explain the "ACID" properties in brief. **(6)**
(b) What do you mean by serializability. Discuss the conflict serializability and view serializability with examples. **(6.5)**

Q5 (a) Draw and explain a neat diagram of three level architecture of database system. **(6)**
(b) Construct an ER diagram for 'Hospital management system'. There would be a set of patients and set of doctors. For each patient, there would be a log of various tests and examinations conducted. Make assumptions if necessary and clearly state them. **(6.5)**

Q6 (a) How the B+ tree index files are maintained? Explain. **(6)**
(b) Explain the method of "query processing" in brief. **(6.5)**

Q7 (a) Discuss clearly inner join, outer join and theta join with example. **(6)**
(b) For the relation R=(A, B, C) and S= (D, E, F) and relation r(R) and s(s), give SQL statement for following expressions and explain. **(6.5)**
(i) $\pi_A(r)$

P.T.O.

ETCS-208
P.1/2

(ii) $\sigma_B = 17(r)$
(iii) r X s
(iv) $\pi_{A,F}(\sigma_{C=D}(rXs))$

Q8 Attempt **any two-** **(2x6.25= 12.5)**

(a) How the deadlock is detected in transactions? Explain its recovery process also.
(b) Normalize the following relation to as much as possible citing the reasons and anamoloies.
R (emp-no, name, street, city, compangname, company-city, manager-name, age, salary, marital-status, spouse-name)
(c) State the mulit-version time stamp based protocol. Suggests a scheme to avoid the phantom phenomenon.

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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2016

Paper Code: ETCS-210	*Subject: Computer Graphics*
Time: 3 Hours	*Maximum Marks: 75*

Note: Attempt all questions as directed. Internal choice is indicated.

Q1 Answer the following questions: **(10x2.5=25)**

(a) Define refresh buffer/frame buffer.
(b) What is pixel?
(c) Digitize a line from (10, 12) to (15, 15) on a raster screen using Bresenhams straight line algorithm.
(d) Define view port.
(e) What are Parametric curves?
(f) Define Clipping.
(g) What is Output Primitive?
(h) What is meant by antialising?
(i) Define Translation.
(j) Differentiate parallel projection from perspective projection.

Unit-I

Q2 (a) Explain DDA line drawing algorithm with Example. **(10)**
(b) What do you mean by scaling? Give example. **(2.5)**

OR

Q3 Write about Cohen-Sutherland line clipping algorithm with an example. **(12.5)**

Unit-II

Q4 Write down and explain the Bresenham's circle drawing algorithm. Assume 10 cm as the radius and co-ordinate as the centre of. **(12.5)**

OR

Q5 (a) Write short notes on Bezier Curves. **(5)**
(b) Derive the Bezier metric. **(5)**
(c) Write down the condition for smoothly joining curve segments. **(2.5)**

Unit-III

Q6 (a) Write down the process of drawing **Oblique Projection on xy plane**. Explain with the help of an example. **(10)**
(b) What are isometric projections? **(2.5)**

OR

Q7 (a) How to generate projection from One Vanishing Point Method? **(6)**
(b) Describe the concept of Solid Modelling. **(6.5)**

Unit-IV

Q8 Write short notes on **any two** of the following: **(6.25x2=12.5)**

(a) Area Subdivision Method
(b) Z-Buffer Method
(c) Specular Reflection Model

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END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2016

Paper Code: ETMA-202 ***Subject: Applied Mathematics-IV***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each Unit. Students can ask for statistical table.

Q1 (a) Find a particular integral of $(D_x^3 + 3D_x^2D_y - 2D_x^2)z = (x^2 + 2y)\,e^{2x+y}$. **(7)**

(b) A die is tossed thrice. Getting 2 or 4 on the die in a toss is success. Find the mean and variance of number of success. **(6)**

(c) Can y = 5 + 2.8 x and x = 3 – 0.5 y be the estimated regression equations of y on x and x on y respectively? Explain. **(5)**

(d) Write the dual to the following primal problem. **(7)**

Max $Z = 3x_1 + 10\,x_2 + 2x_3$

Subject to:

$$2x_1 + 3x_2 + 2x_3 \le 7$$
$$3x_1 - 2x_2 + 4x_3 = 3$$

Where $x_1, x_2, x_3 \ge 0$.

Prove that dual of the dual is primal.

Unit-I

Q2 (a) Find the general solution of $(D^3 - 4D^2D' + 4DD'^2)z = \cos(2x + 3y)$. **(6)**

(b) Find the complete solution of the equation: **(6.5)**

$$(D^2 + D'^2 + 2DD' + 2D + 2D' + 1)\,z = e^{2x+y}$$

Q3 (a) Solve $\frac{\partial^2 u}{\partial x^2} - 2\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0$ *where* $u(0,y) = 0$ *and* $\frac{\partial u}{\partial x}(0,y) = e^{-3y}$ for all y using the method of separation of variables. **(6)**

(b) A long rectangular plate of width π cm with insulated surfaces has its temperature equal to zero on both the long sides and one of the short side so that $u(0, y) = 0$, $u(\pi, y) = 0$, $u(x, \infty) = 0$ and $u(x, 0) = kx$. Find the steady state temperature within the plate. **(6.5)**

Unit-II

Q4 (a) In a bolt factory there are four machines A, B, C and D manufacturing 20%, 15%, 25% and 40% of the total output respectively. Of their outputs 5%, 4%, 3% and 2% in the same order are defective bolts. A bolt is chosen randomly from the factory's production and is found defective. What is the probability that the bolt was manufactured by machine A or D. **(6)**

(b) Calculate the first four moments for the following frequency distribution about the mean and explain the skewness and kurtosis of the frequency distribution. **(6.5)**

X:	-4	-3	-2	-1	0	1	2	3	4
Y:	3	4	5	7	12	7	5	4	3

Q5 (a) Find mean, variance and moment generating function of f(x), where

$$f(x) = \begin{cases} ae^{-ax}, & x > 0 \\ 0, & x \le 0 \end{cases}$$ **(6)**

P.T.O.

(b) If the probability that an individual suffers to a bad reaction form an injection of a given serum is 0.001, determine the probability that out of 2000 individuals. **(6.5)**
(i) exactly 3 (ii) more than 2
individual will suffer to a bad reaction.

Unit-III

Q6 (a) The two regression equation of the variable x and y are $8x - 10y + 66 = 0$ and $40x - 18y = 214$. Given that variance of x = 9. Find **(6)**
(i) the mean of x and y
(ii) the standard deviation of y and
(iii) the coefficient of correlation between x and y.

(b) The results of measurement of electric resistance R of a copper bar at various temperature t^{0c} are listed below: **(6.5)**

t:	19	25	30	36	40	45	50
R:	76	77	79	80	82	83	85

If R = a + bt, find a and b.

Q7 (a) Write at least three important properties of Regression coefficient and prove that if two variables are uncorrelated then the regression lines are perpendicular to each other. **(6)**

(b) A sample of 10 boxes of chips is drawn in which the mean weight is 490 gm and standard deviation of weight is 9 gm. Can the sample be considered to be taken from a population having mean weight 500 gm where $t_{0.5} = 2.26$? **(6.5)**

Unit-IV

Q8 (a) Write the dual of the following problem: **(6)**

Min. $Z = 2x_1 + 3x_2 + 4x_3$
St. $2x_1 + 3x_2 + 5x_3 = 2$
$3x_1 + x_2 + 7x_3 \leq 3$
$x_1 + 4x_2 + 6x_3 = 5$
where $x_2, x_3 \geq 0$ and x_1 unrestricted.

(b) Using dual simplex method solve following LPP. **(6.5)**

Max. $Z = -3x_1 - 2x_2$
Subject to
$x_1 + x_2 \geq 1$
$x_1 + x_2 \leq 7$
$x_1 + 2x_2 \geq 10$
$x_2 \leq 3$
where $x_1, x_2 \geq 0$.

Q9 Using VAM method find basic feasible solution of the following transportation problem. Check optimality and hence find the optimal solution. **(12.5)**

From	A	B	C	D	Supply
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Demand	6	10	12	15	43

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