BACHELOR OF TECHNOLOGY
(COMPUTER SCIENCE AND ENGINEERING)
FOURTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETMA 202		Applied Mathematics – IV	3	1	4	
ETCS 204		Computer Organization and Architecture	3	1	4	M
ETCS 206		Theory of Computation	3	1	4	M
ETCS 208		Database Management Systems	3	1	4	M
ETCS 210		Object Oriented Programming	3	0	3	
ETEC 208		Communication Systems	3	1	4	
PRACTICAL/VIVA VOCE						
ETMA 252		Applied Mathematics Lab	0	2	1	
ETCS 254		Computer Organisation and Architecture Lab	0	2	1	
ETCS 256		Database Management Systems Lab	0	2	1	
ETCS 258		Object Oriented Programming Lab	0	2	1	
ETEC 256		Communication Systems Lab	0	2	1	
ETSS 250		NCC/NSS*#	-	-	1	
TOTAL			**18**	**15**	**29**	

M: Mandatory for award of degree

**NCC/NSS can be completed in any semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards.*

NOTE: 4 weeks Industrial / In-house Workshop will be held after fourth semester. However, Viva-Voce will be conducted in the fifth semester.

#NUES(Non University Examination System)

APPLIED MATHEMATICS-IV

Paper Code: ETMA-202	**L**	**T/P**	**C**
Paper: Applied Mathematics-IV	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives: The objective of this course is to teach the students about the difference equation, probability, curve fitting etc. and other numerical methods to solve various engineering problems.

UNIT – I

Partial Differential Equation: linear partial differential equations with constant coefficient, homogeneous and non homogeneous linear equations. Method of separation of variables. Laplace equation, wave equation and heat flow equation in Cartesian coordinates only with initial and boundary value.

[T1][No. of Hrs. 11]

UNIT II

Probability Theory: Definition, addition law of probability, multiplication law of probability, conditional probability, Baye's theorem, Random variable: discrete probability distribution, continuous probability distribution, expectation, moments, moment generating function, skewness, kurtosis, binomial distribution, Poisson distribution, normal distribution.

[T1,T2][No. of Hrs. 12]

UNIT-III

Curve Fitting: Principle of least square Method of least square and curve fitting for linear and parabolic curve, Correlation Coefficient, Rank correlation, line of regressions and properties of regression coefficients. Sampling distribution: Testing of hypothesis, level of significance, sampling distribution of mean and variance, Chi-square distribution, Student's T- distribution, F- distribution, Fisher's Z- distribution.

[T1,T2][No. of Hrs. 12]

UNIT IV

Linear Programming: Introduction, formulation of problem, Graphical method, Canonical and Standard form of LPP, Simplex method, Duality concept, Dual simplex method, Transportation and Assignment problem.

[T1][No. of Hrs. 10]

Text Books:

[T1] B. S. Grewal,"Higher Engineering Mathematics" Khanna Publications.
[T2] N.M. Kapoor, "Fundamentals of Mathematical Statistics", Pitambar Publications

References Books:

[R1] E. kresyzig," Advance Engineering Mathematics", Wiley publications
[R2] Miller and Freund, " Probability and statistics for Engineers" , PHI
[R3] Gupta and Kapoor, " Fundamentals of Mathematical Statistics" Sultan Chand and Sons
[R4] G. Hadley, "Linear Programming", Narosa.
[R5] Schaum's Outline on Probability and Statistics" Tata McGraw-Hill
[R6] Gupta and Manmohan, " Problems in Operations Research", Sultan Chand and Sons.
[R7] R.K. Jain and S.R.K. Iyengar,"Advanced Engineering Mathematics "Narosa Publications.

COMPUTER ORGANIZATION & ARCHITECTURE

Paper Code: ETCS-204	**L**	**T/P**	**C**
Paper: Computer Organization & Architecture	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To understand the architecture and organization of computer in depth.

UNIT- I

Computer Arithmetic and Register transfer language:

Unsigned notation, signed notation, binary coded decimal, floating point numbers, IEEE 754 floating point standard, Micro-operation, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro operation, Arithmetic Logic Shift Unit.

[T1,T2][No. of hrs. 11]

UNIT- II

Instruction set architecture & computer organization:

Levels of programming languages, assembly language instructions, 8085 instruction set architecture, Instruction Codes, Computer Registers, Computer Instructions, Timing & Control, Instruction Cycle, Memory Reference Instructions, Input-Output and Interrupts

[T1,T2][No. of hrs. 11]

UNIT- III

Control Design:

Instruction sequencing & interpretation, Hardwired & Micro Programmed (Control Unit), Micrprogrammed computers, Microcoded CPU: Pentium processor. Specifying a CPU, Design & implementation of simple CPU, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Internal architecture of 8085 microprocessor.

[T1,T2][No. of hrs. 11]

UNIT- IV

Memory & Input/Output organization: Memory Technology, Main Memory (RAM and ROM Chips), Virtual memory, High-speed memories

Asynchronous Data Transfers, Programmed I/O, interrupts, Direct memory Access, Serial communication, UARTs, **RS-232-C & RS-422** standard

[T1,T2][No. of hrs. 11]

Text Books:

[T1] J. D. Carpinelli, "Computer Systems Organization and Architecture", Pearson Education, 2006.
[T2] J. P. Hayes, "Computer Architecture and Organization", McGraw Hill, 1988.

Reference Books:

[R1] J. L Hennessy and D. A. Patterson, "Computer Architecture: A quantitative approach", Morgon Kauffman, 1992.
[R2] W. Stallings, "Computer organization and Architecture", PHI, 7th ed, 2005.
[R3] B. Parhami, "Computer Architecture: From Microprocessors to Supercomputers", Oxford University press, 2006.

THEORY OF COMPUTATION

Paper Code: ETCS-206	**L**	**T/P**	**C**
Paper: Theory of Computation	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To understand fundamental requirements for building algorithms of any language.

UNIT- I

Overview: Alphabets, Strings & Languages, Chomsky Classification of Languages, Finite Automata, Deterministic finite Automata (DFA) & Nondeterministic finite Automata (NDFA), Equivalence of NDFA and DFA, Minimization of Finite Automata, Moore and Mealy machine and their equivalence, Regular expression and Kleen's Theorem(with proof), Closure properties of Regular Languages, Pumping Lemma for regular Languages(with proof).

[T1,T2][No. of hrs. 11]

UNIT- II

Context free grammar, Derivation trees, Ambiguity in grammar and its removal, Simplification of Context Free grammar, Normal forms for CFGs: Chomsky Normal Form & Greibach Normal Form, Pumping Lemma for Context Free languages, Closure properties of CFL(proof required), Push Down Automata (PDA), Deterministic PDA, Non Deterministic PDA ,Equivalence of PDA and CFG, Overview of LEX and YACC.

[T1,T2][No. of hrs. 11]

UNIT- III

Turing machines, Turing Church's Thesis, Variants and equivalence of Turing Machine, Recursive and recursively enumerable languages, Halting problem, Undecidability, Examples of Undecidable problem.

[T1,T2][No. of hrs. 11]

UNIT- IV

Introduction to Complexity classes, Computability and Intractability, time complexity, P, NP, Co-NP, Proof of Cook's Theorem, Space Complexity, SPACE, PSPACE, Proof of Savitch's Theorem, L ,NL ,Co-NL complexity classes.

[T1,T2][No. of hrs. 11]

Text Books:

[T1] Hopcroft, John E.; Motwani, Rajeev; Ullman, Jeffrey D "Introduction to Automata Theory, Languages, and Computation", Third Edition, Pearson.

[T2] Sipser, Michael, "Introduction to the theory of Computation", Third Edition, Cengage.

References Books:

[R1] Martin J. C., "Introduction to Languages and Theory of Computations", Third Edition, TMH.

[R2] Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI.

[R3] Daniel I.A. Cohen, "Introduction to Computer Theory",Second Edition, John Wiley.

DATABASE MANAGEMENT SYSTEMS

Paper Code: ETCS-208	**L**	**T/P**	**C**
Paper: Database Management Systems	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The concepts related to database, database techniques, SQL and database operations are introduced in this subject. This creates strong foundation for application data design.

UNIT-I : Introductory Concepts of DBMS: Introduction and application of DBMS, Data Independence, Database System Architecture – levels, Mapping, Database users and DBA, Entity – Relationship model, constraints, keys, Design issues, E-R Diagram, Extended E-R features- Generalization, Specialization, Aggregation, Translating E-R model into Relational model.

[T1, T2][No. of Hrs. 10]

UNIT-II : Relational Model: The relational Model, The catalog, Types, Keys, Relational Algebra, Fundamental operations, Additional Operations-, SQL fundamentals, DDL,DML,DCL PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Integrity – Triggers.

[T2, R3][No. of Hrs. 10]

UNIT-III: Functional Dependencies, Non-loss Decomposition, First, Second, Third Normal Forms, Dependency Preservation, Boyce/Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

[T2, R1, R3][No. of Hrs. 10]

UNIT-IV: Transaction Management: ACID properties, serializability of Transaction, Testing for Serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, Database recovery management.

Implementation Techniques: Overview of Physical Storage Media, File Organization, Indexing and Hashing, B+ tree Index Files, Query Processing Overview, Catalog Information for Cost Estimation, Selection Operation, Sorting, Join Operation, Materialized views, Database Tuning.

[T1, T2, R2][No. of Hrs. 12]

Text Books:

[T1] Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 5th Edition, Tata McGraw Hill, 2006

[T2] Elmsari and Navathe, "Fundamentals of Database Systems", 6th Ed., Pearson, 2013

References Books:

[R1] C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.

[R2] J. D. Ullman, "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

[R3] Vipin C. Desai, "An Introduction to Database Systems", West Publishing Co.,

OBJECT ORIENTED PROGRAMMING

Paper Code: ETCS-210	**L**	**T/P**	**C**
Paper: Object Oriented Programming	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To learn object oriented concepts to enhance programming skills.

UNIT – 1:

Objects, relating to other paradigms (functional, data decomposition), basic terms and ideas (abstraction, encapsulation, inheritance, polymorphism). Review of C, difference between C and C++, cin, cout, new, delete operators.

[T1,T2][No. of hrs. 11]

UNIT – II:

Encapsulation, information hiding, abstract data types, object & classes, attributes, methods. C++ class declaration, state identity and behavior of an object, constructors and destructors, instantiation of objects, default parameter value, object types, C++ garbage collection, dynamic memory allocation, metaclass/abstract classes.

[T1,T2][No. of hrs. 11]

UNIT – III:

Inheritance, Class hierarchy, derivation – public, private & protected; aggregation, composition vs classification hierarchies, polymorphism, categorization of polymorphic techniques, method polymorphism, polymorphism by parameter, operator overloading, parametric polymorphism, generic function – template function, function name overloading, overriding inheritance methods, run time polymorphism.

[T1,T2][No. of hrs. 11]

UNIT – IV:

Standard C++ classes, using multiple inheritance, persistant objects, streams and files, namespaces, exception handling, generic classes, standard template library: Library organization and containers, standard containers, algorithm and Function objects, iterators and allocators, strings, streams, manipulators, user defined manipulators, vectors, valarray, slice, generalized numeric algorithm.

[T1,T2][No. of hrs. 11]

Text Books:

[T1] Rumbaugh et. al. "Object Oriented Modelling & Design", Prentice Hall
[T2] A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH

Reference Books:

[R1] A.K. Sharma, "Object Oriented Programming using C++", Pearson
[R2] G . Booch "Object Oriented Design & Applications", Benjamin,Cummings.
[R3] E.Balaguruswamy, "Objected Oriented Programming with C++", TMH
[R4] S. B. Lippman & J. Lajoie, "C++ Primer", 3rd Edition, Addison Wesley, 2000.
[R4] R. Lafore, "Object Oriented Programming using C++", Galgotia.
[R5] D . Parasons, "Object Oriented Programming with C++",BPB Publication.
[R6] Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication.

COMMUNICATION SYSTEMS

Paper Code: ETEC-208	L	T/P	C
Paper: Communication Systems	3	1	4

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the knowledge of electronic communication thereby enabling the student to obtain the platform for studying in communication system..

UNIT I

Introduction

Overview of Communication system and Communication channels, Introduction to Analog Communication & Digital Communication technique,.

Amplitude Modulation

Amplitude modulation, Generation of AM waves, Demodulation of AM waves, DSBSC, Generation of DSBSC waves, Coherent detection of DSBSC waves, single side band modulation, generation of SSB waves, demodulation of SSB waves, vestigial sideband modulation (VSB).

[T1][No. of hrs. 11]

UNIT II

Angle Modulation

Basic definitions: Phase modulation (PM) & frequency modulation (FM), narrow band frequency modulation, wideband frequency modulation, generation of FM waves, Demodulation of FM waves, frequency division (FDM) multiplexing. **Noise Theory:** Noise, Types of noise, Addition of Noise due to several sources in series and parallel, Noise sources. Equivalent Noise Bandwidth, Signal to Noise Ratio, Noise-Figure, Noise Temperature, Calculation of Noise Figure.

[T1,T2][No. of hrs. 11]

UNIT III

Pulse Modulation

Sampling theory, Aliasing effect , practical sampling , Aperture effect ,uniform and non uniform quantization, signal to quantization noise ratio, Companding, , pulse amplitude modulation (PAM), pulse time modulation, pulse code modulation, Time division (TDM) multiplexing, differential pulse code modulation (DPCM), delta modulation (DM), adaptive delta modulation.

[T1,T2][No. of hrs. 11]

UNIT IV Digital Modulation

Amplitude, Frequency and phase shift keying, Differential phase shift keying, MSK QPSK and QAM modulation & detection, BER/SER calculation. **Introduction to Information Theory:** Measurement of Information, mutual information, Shannon's Theorem, channel coding and channel capacity theorem. Huffman code, Lempel–ziv code, Error Control Coding: Parity codes, Hamming codes , Block codes, Syndrome decoding, CRC codes, Introduction to Convolutional coding.

[T1,T2][No. of hrs. 11]

TEXT BOOKS:

[T1] Taub & Schilling, "Principles of Communication Systems", TMH, 1998.
[T2] Simon Haykins, "Communication Systems", John Wiley, 1998.

REFERENCE BOOKS:

[R1] Kennedy, G., "Electronic Communication Systems", McGraw-Hill, 2008, 4th ed.
[R2] V. Chandra Sekar "Analog Communication", Oxford University Press, Incorporated, 2010
[R3] John G Proakis, M.Salehi and G.Bauch "Modern Communication System Using MATLAB**"** Cengage Learning, 3rd edition, 2013
[R3] J. C. Hancock, "An Introduction to the Principles of Communication Theory", TMH, 1998.