



Ref No: JRU/CS&IT/2022/020

Date: 25.08.2022

**DEPARTMENT OF COMPUTER SCIENCE &
INFORMATION TECHNOLOGY**

NOTICE

In pursuance of Notification No. JRU/CS&IT/2021/14 dated 27th July 2021, it is hereby notified that the Board of Studies (BoS) for the Department of Computer Science & Information Technology is reconstituted as follows:

- | | |
|---|-----------------|
| 1. Mrs. Anuradha Sharma | Chairperson |
| 2. Dr. Piyush Ranjan | Member |
| 3. Dr. Ashish Kumar Sinha | Member |
| 4. Mr. Kumar Amrendra | Member |
| 5. Mr. Rajan Kr. Tiwari | Member |
| 6. Dr. Amrita Majumdar | Member |
| 7. Dr. Kumar Rajnish, Associate Professor | External Member |
- Department of Computer Science, BIT Mesra

The chairman shall have power to restructure the above said committee as and when required with the approval of the Hon'ble Vice Chancellor.

A. Sharma
25.08.2022
Coordinator

Department of CS/IT
Jharkhand Rai University, Ranchi

Copy to:

1. Registrar Office
2. Program Office
3. HoD/Coordinator of Faculty of Science & Engineering
4. Faculty Members



Kumar Amrendra <kumar.amrendra@jru.edu.in>

Call for meeting: BoS- Department of Computer Science & Information Technology

1 message

Anuradha Sharma <anuradha.sharma@jru.edu.in>

Wed, Aug 24, 2022 at 5:21 PM

To: Ashish Sinha <ashish.sinha@jru.edu.in>, KUMAR AMRENDRA <kumar.amrendra@jru.edu.in>, RAJAN TIWARI <ranjan.tiwari@jru.edu.in>, PIYUSH RANJAN <piyush.ranjan@jru.edu.in>, AMRITA MAJUMDAR <amrita.majumdar@jru.edu.in>

Hon'ble Sir,

Greetings from Jharkhand Rai University!

This is to inform you that a meeting of the Board of Studies of the Department of Computer Science & Information Technology is scheduled on 26.8.2022(Friday) from 10:00 am in the conference hall ,Jharkhand Rai University Kamre.

All the members are requested to make it convenient to attend the same.

Agenda for the proposed Board of Studies (BoS) meeting:-

1. To approve the minutes of the last meeting of BoS held on 27th July 2021.
2. To approve the action taken report of the last meeting of BoS held on 27th July 2021.
3. To discuss and approve the syllabi of 3rd and 4th semesters of B.Tech in Computer Science and Engineering w.e.f. 2021-25 batch.
4. To discuss and approve the syllabus of Artificial Intelligence and its application to be taken through SWAYAM (Fundamentals of Artificial Intelligence) for MCA III 2021-23 batch.
5. To implement a Community Engagement and Social Responsibility course in the 3rd semester of BCA and B.Tech CSE.
6. To Implement Managing Personal Finance course in the final semester of BCA, MCA and B.Tech CSE.
7. To further strengthen the Industry-Academia interface.
8. To discuss any other matter with the permission of the chairperson.

—
Regards,**Anuradha Sharma**

Assistant Professor,

Department of Computer Science and Information Technology

Jharkhand Rai University, Ranchi

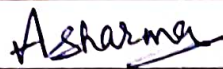
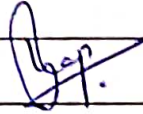

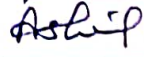
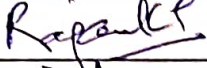
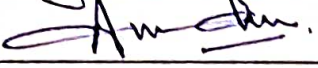
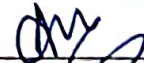
Department of Computer Science & Information Technology

BOARD OF STUDIES

Attendance Sheet

Date: August 26, 2022

Time: 10:00AM

Sl. No.	Members	Signature
Chairperson		
1.	Mrs. Anuradha Sharma	
External Expert		
2	Dr. Kumar Rajnish	
Members		
3	Dr. Piyush Ranjan	
4	Dr. Ashish Kumar Sinha	
5	Mr. Rajan Kumar Tiwari	
6	Mr. Kumar Amrendra	
Expert from the Department of Management		
7	Dr. Amrita Majumdar	

Department of Computer Science and Information Technology

Dated: 27.8.2022

MINUTES OF MEETING

The meeting of the Board of Studies of Department of Computer Science & Information Technology was held on 26th August 2022 at 10:00 am in conference hall, Jharkhand Rai University, Kamre.

The following Members were present:

Sl. No.	BOS Members	
1	Ms. Anuradha Sharma, Assistant Professor ,Dept. of CS&IT , JRU	Chairperson
2	Dr. Kumar Rajnish, Associate Professor, Dept. of CSE,BIT Mesra	External Member
3	Dr. Piyush Ranjan, Professor ,Dept. of CS&IT,JRU	Internal Member
4	Dr. Ashish Kumar Sinha, Associate Professor, Dept. of CS&IT,JRU	
5	Mr. Kumar Amrendra, Assistant Professor, Dept. of CS&IT,JRU	
6	Mr. Rajan Kumar Tiwari, Assistant Professor, Dept. of CS&IT, JRU	
7	Dr. Amrita Majumdar, Assistant Professor, Dept. of Management, JRU	Member

At the outset, the chairperson welcomed the members for attending the meeting and introduced the members of Board of Studies. The chairperson further expressed special thanks to Dr. Kumar Rajnish for sparing time from his busy schedule to attend the meeting. The following deliberations were made as per the circulated agenda and the Board decided/recommended as under:-

1. Item No. BoS/04/01: To approve the minutes of the last meeting of BoS held on 27th July 2021.

The Board considered and confirmed the minutes of the meeting held on 27.7.2021.

(Annexure 1)



2. Item No. BoS/04/02: To approve the action taken report of the last meeting of BoS held on 27th July 2021.

Ms. Anuradha Sharma communicated the action taken report to the members. The action taken report of the last BoS meeting was approved by the members.

(Annexure 1)

3. Item No. BoS/04/03 : To discuss and approve the syllabi of 3rd and 4th semesters of B.Tech in Computer Science and Engineering w.e.f. 2021-25 batch.

The syllabus of 3rd and 4th semesters of B.Tech CSE were presented to the members. Data Structure and Algorithm, Computer Organization & Architecture, Object Oriented Programming with JAVA, Discrete Mathematics and Design & Analysis of Algorithm were proposed as professional core courses along with Mathematics III, Biological science for Engineers, Analog Electronic circuit, Digital electronics as basic science courses. Entrepreneurship, Community Engagement and Social Responsibility and Disaster Management were also introduced. Effective Technical Communication and Professional, Practice, laws and Ethics were also introduced.

The members after due deliberations, approved the syllabus.

(Annexure 2)

4. Item No. BoS/04/04 : To discuss and approve the syllabus of Artificial Intelligence and its application to be taken through SWAYAM (Fundamentals of Artificial Intelligence) for MCA III 2021-23 batch.

Dr. Piyush Ranjan said that our University emphasizes on MOOCs courses. Ms. Anuradha Sharma communicated the syllabus of Fundamentals of Artificial Intelligence which have been taken through NPTEL, 12 weeks course. In every semester we encourage our students to opt one course from MOOCs which is made compulsory by the Department. The members compared the syllabus of Artificial Intelligence and its Application with Fundamentals of Artificial Intelligence and approved the same.

(Annexure 3)

5. Item No. BoS/04/05: To implement a Community Engagement and Social Responsibility course in the 3rd semester of BCA and B.Tech CSE.



For the development of the social susceptibility amongst the students, Community Engagement and Social Responsibility course have been introduced in the BCA and B.Tech CSE. Dr. Piyush Ranjan stated that this 3 credit course is divided into 15 hours of theory and 15 hours of field work. The members went through the course content and approved the same.

(Annexure 4)

6. Item No. BoS/04/06: To Implement Workshop on Managing Personal Finance in the final semester of BCA, MCA and B.Tech CSE.

To provide the students with basic financial knowledge regarding investment opportunities, risk management methods, life insurance, maintaining good credit, understanding of tax implication and to develop personal balance sheet, money management and workable budget, Workshop on Managing Personal Finance have been introduced in the final semester of BCA, MCA and B.Tech CSE. It is a qualifying noncredit course. The board went through the syllabus and approved it.

(Annexure 5)

7. Item No. BoS/04/07: To further strengthen the Industry-Academia interface.

Ms. Anuradha Sharma informed the Board regarding the MoU of the Department with Codezeal Technology Pvt. Ltd. with the objective to provide Live Project, SIP, Industrial Visit, Faculty Exchange program and Placements of students of Jharkhand Rai University, Ranchi. Dr. Piyush Ranjan suggested for further strengthening the industry academia interface, more actionable MoUs and collaborations with the industry should be done. Later Dr. Rajnish suggested to introduce the internship/ on-the-job training in BCA, MCA and B.Tech CSE program.

8. Item No. BoS/04/08: To discuss any other matter with the permission of the chairperson. Dr. Piyush Ranjan suggested that in B.Tech CSE semester III, for the course "Biological Science for Engineers", one tutorial class should be provided by the faculty of CS&IT wherein the application of biology in Computer Science and Engineering can be briefed.

(Annexure 6)

Ms. Anuradha Sharma thanked to all the members for their kind cooperation and meeting came to an end.

A. Sharma

**Department of Computer Science and Information
Technology**

MINUTES OF MEETING

Mode: Through Online (Meeting Link: <https://meet.google.com/cyx-jsxn-hrb>)

The meeting of Board of Studies of Department of Computer Science & Information Technology was held on 27th July 2021 at 3:00 pm in online mode .

The following members were present:

Sl. No.	BOS Members	
1	Ms. Anuradha Sharma, Assistant Professor, Dept. of CS & IT, JRU	Chairperson
2	Dr. Rajnish Kumar, Associate Professor, Dept. of CSE, BIT Mesra	External Member
3	Dr. Ashish Kumar Sinha, Associate Professor, Dept. of CS & IT, JRU	Internal Member
4	Dr. Priyanka Srivastava, Assistant Professor, Dept. of CS & IT, JRU	
5	Mr. Rajan Kumar Tiwari, Assistant Professor, Dept. of CS & IT, JRU	
6	Mr. Kumar Amrendra , Assistant Professor, Dept. of CS&IT, JRU	
7	Dr. Amrita Majumdar, Assistant Professor, Dept. of Management, JRU	Member

At the outset, the chairperson welcomed the Members for attending the meeting and introduced the members of Board of Studies. The chairperson further expressed special thanks to Dr. Rajnish Kumar for sparing time from his busy schedule to attend the meeting. The following deliberations were made as per the circulated agenda and the Board decided/recommended as under:-

- 1. Item No. BOS/03/01 : To approve the minutes of last meeting of BoS held on 3rd April 2021**

The Board considered and confirmed the minutes of the meeting held on 3.4.2021 (ANNEXURE 1)

- 2. Item No. BoS/03/02: To approve the action taken report of last meeting of BoS held on 3rd April 2021.**

The Board communicated the action taken report to the members. It was noted that the action taken where necessary on the various decisions taken in the meeting held on 3rd April 2021. (ANNEXURE 1)

- 3. Item No. BOS/03/03: To discuss and approve the syllabi of 3rd Semester of Two year MCA Program w.e.f. 2020-21.**

Ms. Anuradha Sharma presented the syllabi of MCA IIIrd Semester to the members. External expert Dr, Rajnish Kumar suggested to include Data Mining and warehousing as main paper of 4 credit and Compiler design as one of the Departmental elective. (ANNEXURE 2)

- 4. Item No. BOS/03/04: To discuss and approve the introduction of a new course in BCA w.e.f. 2021-24.**

The Board resolved to approve the introduction of new course 'PYTHON PROGRAMMING' in BCA programme of credit 4(3 lecture and 2 practical) in IVth semester instead of Visual Basic.Net of IInd Semester. The Board appreciated the syllabus content of Python Programming. (ANNEXURE 3)

- 5. Item No. BOS/03/05: To discuss and approve the Regulation and Course Scheme of B.Tech in Computer Science and Engineering w.e.f. 2021-25.**

The Board resolved to approve the regulation and course scheme of B.Tech CSE programme. (ANNEXURE 4)

6. **Item No. BOS/03/05: To discuss and approve the syllabi (1st and 2nd semesters) of B.Tech in Computer Science and Engineering w.e.f. 2021-25.**
The Board went through the syllabi (1st and 2nd semesters) of B.Tech CSE programme and resolved to approve it. (ANNEXURE 5)

7. **Item No. BOS/03/06: To discuss and approve the introduction of a skill based certificate course.**

The Board suggested for some modification in the course and suggested that it should be based on industry demand.

8. **To discuss and approve the syllabus of Fundamentals of Artificial Intelligence to be taken through SWAYAM for MCA III.**

The Board thoroughly gone through the syllabus and approved it.

9. **To discuss and approve the syllabus of Cloud Computing to be taken through SWAYAM for B.Tech CSE VII.**

The Board thoroughly gone through the syllabus and approved it.

Ms. Anuradha Sharma thanked to all the members for their kind cooperation and meeting came to end.



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Annexure - 2(A)

Semester III

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OR

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Program: B T E C H

Semester: Third

Course: Mathematics III (Probability & Statistics)

Course Code: BSC201

L	T	P	C
2	0	0	2

Course Objective:

The objectives of this course are:

- To tabulate statistical information given in descriptive form and to use graphical techniques to interpret
- To compute various measures of central tendency, dispersion, skewness and kurtosis.
- To find the probabilities of events.
- To analyze data pertaining to discrete and continuous variables and to interpret the results.
- To obtain a probability distribution of random variable (one or two dimensional) in the given situation.

Course Outcome:

On completion of the course students will be able to :

- Acquaintance with various methods of collecting data and get familiar with some elementary methods of data viz. Measures of central tendency, dispersion, skewness and kurtosis and to interpret them.
- Understanding the basic concepts of probability and to find probabilities of various events.
- Understand types of random variables, concepts of conditional probability and ability to distinguish between univariate and bi variate probability distributions; transformation of continuous random variable and its application.
- Knowledge of characteristics of random variables such as expectation, variance and also to compute various generating functions.



Course Content:

Topics	Hours
Unit I: Probability	
Probability spaces, conditional probability, independence, Bayes' rule, Discrete & Continuous random variables and their properties, Independent random variables, the multinomial distribution, Probability distributions: Binomial, Poisson and Normal distributions, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Chebyshev's Inequality.	9
Unit II: Statistics	
Basic Statistics, Measures of Central tendency: Moments, Skewness and Kurtosis, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.	6

Suggested Text/Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).



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Program: BTECH

Semester: Third

Course: Biological Science for Engineers

Course Code: BSC202

L	T	P	C
3	0	0	3

Course Objective:

- To develop the individual's sensitiveness to nature and make him feels at home with it.
- To understand all living beings on the earth emerged from one being to another which inculcates 'oneness' of all living beings.
- To explain the living world in terms of scientific principles and appreciating all organisms which behave indifferent ways.
- To show capabilities, which differ from one another.

Course Outcome:

After studying the course, the student will be able to:

- Describe how biological observations of 18th Century that lead to major discoveries.
- Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological
- Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
- Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
- Classify enzymes and distinguish between different mechanisms of enzyme action.
- Identify DNA as a genetic material in the molecular basis of information transfer.
- Analyse biological processes at the reductionistic level
- Apply thermodynamic principles to biological systems.
- Identify and classify microorganisms.



Course Content:

Topics	Hours
UNIT I- Introduction	
<p>Purpose: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry</p> <p>Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries.</p> <p>Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry.</p>	2
UNIT II - Classification	
<p>Purpose: To convey that classification per se is not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted.</p> <p>Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization - Autotrophs, heterotrophs, lithotrophs (d) Ammonia excretion – aminotelic, uricotelic, ureotelic (e) Habitata- aquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegans, A. Thaliana, M. musculus</p>	3
UNIT III - Genetics	
<p>Purpose: To convey that “ Genetics is to biology what Newton’s laws are to Physical Sciences”</p> <p>Mendel’s laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be given not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics.</p>	4
UNIT IV- Biomolecules	4



<p>Purpose: To convey that all forms of life are built from the same building blocks and yet the manifestations are as diverse as one can imagine. Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.</p>	
UNIT V - Enzymes	
<p>Purpose: To convey that without catalysis life would not have existed on earth Enzymology: How to monitor enzyme catalyzed reactions. How does an enzyme catalyze reactions. Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis.</p>	4
UNIT VI - Information Transfer	
<p>Purpose: The molecular basis of coding and decoding genetic information is universal. Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination.</p>	4
UNIT VII - Macromolecular analysis	
<p>Purpose: How to analyse biological processes at the reductionist level Proteins- structure and function. Hierarchy in protein structure. Primary, secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.</p>	5
UNIT VIII - Metabolism	
<p>Purpose: The fundamental principles of energy transactions are the same in physical and biological world. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergonic reactions. Concept of K_{eq} and its relation to standard free energy. Spontaneity. ATP as an energy currency. This should include the breakdown of glucose to $CO_2 + H_2O$ (Glycolysis and Krebs cycle) and synthesis of glucose from CO_2 and H_2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge</p>	5
UNIT IX- Microbiology	
<p>Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media</p>	



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compositions. Growth kinetics. pose: How to analyses biological processes at the reductionist level
Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

References:

- 1)Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- 2)Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
- 3)Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
- 4)Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
- 5)Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers



Program: BTECH

Semester: Third

Course: Analog Electronic Circuits

Course Code: 3ECS201

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- The goal of this course is to introduce and verify basic principles, operation and applications of the various Analog Electronic circuits of Diode, BJT and MOSFET for various functions.
- To make students understand and analyze the design and working of Operational amplifiers and their configurations.

COURSE OUTCOMES

- The ability to understand the characteristics of transistors.
- Design and analyse various rectifier and amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.



Course Content:

Topics	Hours
Unit I	
Diode circuits P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.	4
Unit II	
BJT circuits Structure and I- V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common- emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits	8
Unit III	
MOSFET circuits MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency equivalent circuit.	8
Unit IV	
Differential, multi-stage and operational amplifiers Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)	8
Unit V	
Linear applications of op-amp Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion.	8
Unit VI	
	6



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Nonlinear applications of op-amp **UCC RECOGNISED UNIVERSITY**, Zero Crossing Detector,
Square-wave and triangular-wave generators. Precision rectifier, peak detector. Monoshot.
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Text/References:

- A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
- J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
- J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
- P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
- P.R. Gray, R.G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.



Program: BTECH

Semester: Third

Course: Analog Electronic Circuits Lab

Course Code: 3ESC201P

L	T	P	C
0	0	4	2

Course Objective:

1. The goal of this course is to introduce and verify basic principles, operation and applications of the various Analog Electronic circuits of Diode, BJT and MOSFET for various functions.
2. To make students understand and analyze the design and working of Operational amplifiers and their configurations.

List of Experiment (Analog Electronics Circuit)

1. Verify & simulate the Ohm's Law for Resistance in series by using LabVIEW.
2. Design and simulate P-N junction diode circuit to verify its I-V characteristics by using simulation software LabVIEW.
3. Design & Verify the Bipolar Junction Transistor for both Common Emitter & common Base.
4. Design and simulate Zener diode circuit to plot Volt-Ampere characteristics by using LabVIEW.
5. Study of basic properties of operational Amplifier:
 - A. Inverting
 - B. Non- Inverting Amplifier
6. Design & Simulate the Differentiator & Integrator using operational Amplifier by using LabVIEW.
7. Study the input and output Characteristics of MOSFET.
8. Design & plot the graph of RC Differentiator and Integrator by using LabVIEW.



Program: BTECH

Semester: Third

Course: Data Structure & Algorithms

Course Code: 3PCCCS201

L	T	P	C
3	0	0	3

COURSE OBJECTIVE

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To enable them to write algorithms for solving problems with the help of fundamental data structures

COURSE OUTCOME

On completion of this course, the students will be able to:

- Learn the basic types for data structure, implementation and application.
- Know the strength and weakness of different data structures.
- Use the appropriate data structure in context of solution of given problem.
- Develop programming skills which require to solve given problem.

Course Content:

Topics	Hours
Unit I	
Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.	8
Unit II	
Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.	8
Unit III	
Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of	9



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Stack and Queue, Header nodes, Doubly Linked Lists, operations on it and algorithmic analysis; Circular Linked Lists, an operations their algorithms and the complexity analysis.	
Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis	
Unit IV	
Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.	5
Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	

Suggested books:

“Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

Suggested reference books:

Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company

“How to Solve it by Computer”, 2nd Impression by R.G. Dromey, Pearson Education.



Program: BTECH

Semester: Third

Course: Data Structure & Algorithms Lab

Course Code: 3PCCCS201P

L	T	P	C
0	0	4	2

□□□□□□□□

1. To read and display n numbers using an array.
2. To find transpose a 3 X 3 matrix.
3. To insert a number at a given location in an array.
4. To delete a number from a given location in an array.
5. To create a linked list
6. To create a linked list and perform insertions:
 - a) at beginning b) at end c) before a given node
7. To create a linked list and perform deletions:
 - a) from beginning b) from end c) at a given node
8. To create a circular linked list and perform insertion at the beginning of list.
9. To create a circular linked list and perform insertion at the end of list.
10. To perform Push, Pop and Peep operations on a stack.
11. To implement a linear queue.
12. To implement a priority queue.
13. To search an element in an array using linear search technique.
14. To search an element in an array using binary search technique.
15. To sort an array using insertion sort algorithm.
16. To implement quick sort algorithm.
17. To sort an array using bubble sort algorithm.



Program: BTECH

Semester: Third

Course: Computer Organization & Architecture

Course Code: 3PCCCS202

L	T	P	C
3	0	0	3

Course Objective:

- How Computer Systems work & the basic principles Instruction Level Architecture and Instruction Execution The current state of art in memory system design
- How I/O devices are accessed and its principles.
- To provide the knowledge on Instruction Level Parallelism To impart the knowledge on micro programming
- Concepts of advanced pipelining techniques.

Course Outcome:

By the end of the course students will be able to:

- Draw the functional block diagram of a single bus **architecture of a computer and describe the function of the** instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
- **Write** assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).
- Write a flowchart for Concurrent access to memory and cache coherency in **Parallel Processors** and describe the process.
- Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
- Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology



Course Content:

Topics	Hours
Unit I	
Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU—registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and-add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.	10
Unit II	
Introduction to x86 architecture. CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU. Memory system design: semiconductor memory technologies, memory organization. Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers—program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes—role of interrupts in process state transitions, I/O device interfaces – SCII, USB	9
Unit III	
Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.	6
Unit IV	
Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.	5

Suggested books:

“Computer Organization and Design: The Hardware/Software Interface”, 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.

“Computer Organization and Embedded Systems”, 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

Suggested reference books:

“Computer Architecture and Organization”, 3rd Edition by John P. Hayes, WCB/McGraw-Hill

“Computer Organization and Architecture: Designing for Performance”, 10th



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Edition by William Stallings, Pearson Education.
"Computer System Design and Architecture", 2nd Edition by Vincent P.
Heuring and Harry F. Jordan, Pearson Education.



Program: BTECH

Semester: Third

Course: Computer Organization & Architecture Lab

Course Code: 3PCCCS202P

L	T	P	C
0	0	4	2

List of Experiments:

1. To design the circuit of half adder.
2. To design the circuit of full adder.
3. To design the circuit of half subtractor.
4. To design the circuit of full subtractor.
5. To design an 8×1 Multiplexer.
6. To design a 4 bit combinational shifter.
7. To design a BCD adder.
8. To design a 4-bit adder subtractor.
9. To design 2:4 Decoder
10. Write the working of 8085 simulator GNUsim8085 and basic architecture of 8085 along with small introduction.
11. Study the complete instruction set of 8085 and write the instructions in the instruction set of 8085 along with examples.
12. Write an assembly language code in GNUsim8085 to implement data transfer instruction.
13. Write an assembly language code in GNUsim8085 to store numbers in reverse order in memory location.
14. Write an assembly language code in GNUsim8085 to implement arithmetic instruction.
15. Write an assembly language code in GNUsim8085 to find the factorial of a number.



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Program: BTECH

Semester: Third

Course: Effective Technical Communication

Course Code: HSMC201

L	T	P	C
3	0	0	3

Course Objective:

1. To teach students the principles of technical communication for their academic and professional needs, focusing on essential written and oral skills for presenting technical information effectively.
2. To make the students aware of the basic principles, which include the analysis of context, purpose and audience.
3. To enhance fundamentals of technical report writing.
4. To equip their effective technical presentations.

Course Outcome:

1. Develop an effective technical report, displaying the ability to employ appropriate rhetorical strategies.
2. Write an effective technical abstract, displaying the ability to select important pieces of information of synthesize them into an accurate preview of report.
3. Illustrate and examine the knowledge of ethical aspects of engineering.
4. Communication in diverse formal situations taking place in organization.



Course Content:

Topics	Hours
Unit I	
Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.	10
Unit II	
Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, usability, Human factors, Managing technical communication projects, time estimation, single sourcing, localization.	7
Unit III	
Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity	5
Unit IV	
Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.	4
Unit V	
Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, creativity.	4

Text/Reference Books:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)



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6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)



Program: BTECH

Semester: Third

Course: Community Engagement and Social Responsibility

Course Code: MC201

L	T	P	C
1	0	2	2

Course Objective:

CLO 1: To develop an appreciation of rural culture, life-style and wisdom amongst students.

CLO 2: To learn about the status of various agricultural and rural development programmes.

CLO 3: To understand causes for rural distress and poverty and explore solutions for the same.

CLO 4: To apply classroom knowledge of courses to field realities and thereby improve quality of learning.

Course Outcomes:

On the completion of the Course, the students will be able to:

CO 1: Gain an understanding of rural life, culture and social realities.

CO 2: Develop a sense of empathy and bonds of mutuality with local community.

CO 3: Appreciate significant contributions of local communities to Indian society and economy.

CO 4: Learn to value the local knowledge and wisdom of the community.

CO 5: Identify opportunities for contributing to community's socio-economic improvements.

Course Content:

Topics	Hours
Unit 1: Appreciation of Rural Society	8
Rural life style, rural society, caste and gender relations, rural values with respect to community, nature and resources, elaboration of "soul of India lies in villages" (Gandhi), rural infrastructure.	
ASSIGNMENT: Prepare a map (physical, visual or digital) of the village you visited and write an essay about inter-family relations in that village.	
Unit II: Understanding rural economy & livelihood	8
Agriculture, farming, landownership, water management, animal husbandry, non-farm livelihoods and artisans, rural entrepreneurs, rural markets.	
ASSIGNMENT: Describe your analysis of rural household economy, its challenges and possible pathways to address them.	
Unit III: Rural Institutions	8
Traditional rural organisations, Self-help Groups, Panchayati raj institutions (Gram Sabha, Gram Panchayat, Standing Committees), local civil society, local administration.	



ASSIGNMENT: How effectively are ACCREDITED BY NAAC is functioning in the village? What would you suggest to improve their effectiveness? Present a case study (written or audio- visual)	
Unit IV: Rural Development Programmes	
History of rural development in India, current national programmes: Sarva Shiksha Abhiyan, Beti Bachao, Beti Padhao, Ayushman Bharat, Swatchh Bharat, PM Awaas Yojana, Skill India, Gram Panchayat Decentralized Planning, NRLM, MNREGA, etc	8
ASSIGNMENT: Describe the benefits received and challenges faced in the delivery of one of these programmes in the rural community; give suggestions about improving Implementation of the programme for the rural poor.	

Suggested Readings:

1. Singh, Katar, Rural Development : Principles, Policies and Management, Sage Publications, New Delhi, 2015.
3. A Hand book on Village Panchayat Administration, Rajiv Gandhi Chair for Panchayati
4. Raj Studies, 2002.
5. United Nations, Sustainable Development Goals, 2015 un.org/sdgs/
6. M.P.Boraian, Best Practices in Rural Development, Shanlax Publishers, 2016

Ashtak
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Ashtak



SEMESTER IV

Aswathy

Anshu

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OR

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B.TECH IN COMPUTER SCIENCE AND ENGINEERING
SEMESTER IV

COURSE SCHEME

SEMESTER IV												
S.No.	CATEGORY	CODE	COURSE TITLE	Periods			Evaluation Scheme				Subject Total	Credit
				L	T	P	Assignment	TA	Total	ESE		
1	Engineering Science Course	ESC202	Digital Electronics	3	0	0	20	10	30	70	100	3
2	Professional Core Course	3PCCCS203	Object Oriented Programming with JAVA	3	0	0	20	10	30	70	100	3
3	Professional Core Course	3PCCCS204	Discrete Mathematics	3	1	0	20	10	30	70	100	4
4	Professional Core Course	3PCCCS205	Design & Analysis of Algorithms	3	0	0	20	10	30	70	100	3
5	Humanities and Social Sciences	HSMC202	Professional Practice, Laws and Ethics	3	0	0	20	10	30	70	100	3
6	Humanities and Social Sciences	HSMC203	Entrepreneurship	3	0	0	20	10	30	70	100	3
7	Mandatory Course	MC201	**Disaster Management	2	0	0	20	10	30	70	100	0
PRACTICAL /SESSIONAL												
1	Engineering Science Course	ESC202P	Digital Electronics Lab	0	0	4			30	20	50	2
2	Professional Core Course	3PCCCS205P	Design & Analysis of Algorithms Lab	0	0	4			30	20	50	2
3	Professional Core Course	3PCCCS203P	Object Oriented Programming with JAVA	0	0	4			30	20	50	2
									TOTAL	850	25	



Program: BTECH

Semester: Fourth

Course: Digital Electronics

Course Code: ESC202

L	T	P	C
3	0	0	3

Course Objective:

The objective of this course is:

- Introduce the concept of digital and binary systems.
- Able to design and analyze sequential and combinational logic circuits.
- Reinforce the concepts, working principles and key applications of memory devices.

Course Outcome:

After studying the course, the student will be able to:

- **CO1:** Understand working of logic families and logic gates.
- **CO2:** Design and implement Combinational and Sequential logic circuits.
- **CO3:** Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- **CO4:** Be able to use PLDs to implement the given logical problem.



Course Content:

Topics	Hours
Module 1: Fundamentals of Digital Systems and logic families	
Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic	07
Module II: Combinational Digital Circuits	
Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization	07
Module III: Sequential circuits and systems	
A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J-K and D-types flip flops, application of flip flops, shift registers, application of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.	07
Module IV: A/D and D/A Converters	
Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs	07
Module V: Semiconductor memories and Programmable logic devices	



Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), content addressable memory (CAM), charge coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDs), Field Programmable Gate Array (FPGA).

Suggested Reading:

- R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
- M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
- A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India



Program: BTECH
Semester: Fourth
Course: Digital Electronics lab
Course Code: ESC202P

L	T	P	C
0	0	4	2

List of Experiment:

1. To illustrate & verify the working of AND, OR & NOT GATE.
2. To illustrate & verify the working of Exclusive OR & Exclusive NOR GATE
3. To illustrate & verify the working of NAND & NOR GATE
4. To Demonstrate the De-Morgan's Theorem.
5. To illustrate the working of Full adder & Half adder using various logic GATES.
6. To illustrate the working of Full subtractor & Half subtractor using various logic GATES.
7. To study IC 7404, IC 7432 & IC 740 and verify the AND, OR & NOT GATE presence in it.



Program: BTECH

Semester: Fourth

Course: Object Oriented Programming with Java

Course Code: 3PCCCS203

L	T	P	C
3	0	0	3

Course Objective:

- Knowledge of the structure and model of the Java programming language
- Use the Java programming language for various programming technologies
- Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements
- Propose the use of certain technologies, development of code/ software by implementing them in the Java Programming language to solve the given problem

Course Outcome:

After successful completion of the course, the students are able to

- Use the syntax and semantics of java programming language and basic concepts of OOP.
- Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
- Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
- Design event driven GUI and web related applications which mimic the real word scenarios.



Course Content:

Topics	Hours
Module 1:	
JAVA environment. JAVA program structure, Tokens, Statements, JAVA virtual machine, Constant & Variables, Data Types, declaration of Variables, Scope of Variables, Symbolic Constants, Type Casting. Operators: Arithmetic, Relational, Logical Assignments, Increment and Decrement, Conditional, Bitwise, Special.	05
Module 2:	
Expressions & its evaluation. If statement, if...else... statement, Nesting of if...else... statements, else...if Ladder, Switch, ?operators, Loops –While, Do, For, Jumps in Loops, Labeled Loops. Defining a Class, Adding Variables and Methods.	06
Module 3:	
Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods. Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Classes, Visibility Control. Arrays: One Dimensional & two Dimensional, strings, Vectors, wrapper Classes, Defining Interface Extending Interface, Implementing Interface, Accessing Interface Variable, System Packages, Using System Package Adding a Class to a Package, Hiding Classes.	10
Module 4:	
Creating Threads, Extending the Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the Executable Interface. Local and Remote Applets Vs Applications, Writing Applets, Applets Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, Passing Parameters to Applets, Aligning the Display, HTML Tags & Applets ,Getting Input from the User.	09

Suggested Readings:

1. Programming with Java, E.Balaguruswamy, TMH.
2. Core Javafor beginners, RASHMI Kanta Das, Vikas pub.



Program: BTECH
Semester: Fourth
Course: Object Oriented Programming with Java Lab
Course Code: 3PCCCS203

L	T	P	C
0	0	4	2

List of Experiment:

1. Program to find square root of given number
2. Program to enter principal, rate & time and find simple interest
3. Program to find whether a year is leap year or not
4. Program to enter a number from keyboard and find out Fibonacci series
5. Program to enter a number from keyboard and find out factorial of the number
6. Program to enter a number from keyboard and check whether the number is palindrome or not
7. Program to enter a number from keyboard and print the prime numbers present within it
8. Program to enter a number from keyboard and determine whether it is Armstrong or not.
9. Program to demonstrate switch statement
10. To swap two numbers without using third variable
11. To find the greatest among 3 numbers
12. Program to sort an array in an ascending order
13. Program to find out the sum and average of the elements present in an array
14. Program to add the elements of two different two dimensional array.
15. Program to find out the biggest and smallest number from a matrix.
16. Program to implement the concept of final class
17. Program to o implement the concept of interface
18. Program to reverse a specified string.
19. Write a program in java to show the user defined package.
20. Program to create an applet
21. Program to implement the concept of thread



Program: BTECH

Semester: Fourth

Course: Discrete mathematics

Course Code: 3PCCCS205

L	T	P	C
3	1	0	4

Course Objectives:

To expose the students to the following:

- Propositional function, quantifiers, rules of inference.
- Binary relations, posets, Hasse diagram, lattice, Functions, and pigeonhole principle.
- How to generate various types of set, relation and functions recursively and solve them.
- Various concepts in graphs like its representation, planar graphs, graph coloring and trees

Course Outcomes

After successful completion of course the student should be able to:

CO1: Know how to represent various statements using set, relations, functions, permutations and combinations, groups, graphs and trees

CO2: Use logical notations to formulate and reason about fundamental mathematical concepts such as sets, relations, functions and algebraic structures

CO3: Analyse the growth of functions and real world problems using various concepts like recurrence relations, graph coloring, etc.

CO4: Model and solve real world problems using graphs and trees.



Course Content:

Topics	Hours
Module 1: Sets, Relation and Function	
Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.	10
Module 2: Principles of Mathematical Induction	
The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic. Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.	08
Module 3: Propositional Logic	
Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.	07
Module 4: Algebraic Structures and Morphism	
Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form	09
Module 5: Graphs and Trees	
Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.	06

Suggested readings:

- J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
- Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
- Discrete Mathematics, Tata McGraw - Hill



Program: BTECH

Semester: Fourth

Course: Design and Analysis of Algorithms

Course Code: 3PCCCS205

L	T	P	C
3	0	0	3

Course Objectives:

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To enable them to write algorithms for solving problems with the help of fundamental datastructures

Course Outcome:

- **CO1:** For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
- **CO2:** For a given Search problem (Linear Search and Binary Search) student will able to implement it.
- **CO3:** For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
- **CO4:** Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
- **CO5:** Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.



Course Content:

Topics	Hours
Module 1: Introduction	
Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.	07
Module 2: Stacks and Queues:	
ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation- Corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue, Operations on each types of Queue.	06
Module 3: Linked Lists:	
several operations: Traversing, Searching, of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.	07
Singly linked lists: Representation in memory, Algorithms of Insertion into, Deletion from linked list; Linked representation	
Module 4: Tree and Graph	
Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.	05
Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	
Module 5: Sorting and Hashing:	
Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.	05



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Suggested Readings:

- “Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
- Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
- “How to Solve it by Computer”, 2nd Impression by R.G. Dromey, Pearson Education.



Program: BTECH

Semester: Fourth

Course: Design and Analysis of Algorithms Lab

Course Code: 3PCCCS205P

L	T	P	C
0	0	4	2

List of Experiment:

1. To read and display n numbers using an array.
2. To find transpose a 3 X 3 matrix.
3. To insert a number at a given location in an array.
4. To delete a number from a given location in an array.
5. To create a linked list and perform insertions
 - a) at beginning b) at end c) before a given node d) after a given node
6. To create a linked list and perform deletions
 - a) from beginning b) from end c) at a given node d) After a given node
7. To create a circular linked list and perform insertion at the beginning of list.
8. To create a circular linked list and perform insertion at the end of list.
9. To create a circular linked list and perform deletion from the beginning of list.
10. To create a circular linked list and perform deletion from the end of list.
11. To perform Push, Pop and Peep operations on a stack.
12. To implement a linear queue.
13. To implement a linked queue.
14. To implement a priority queue.
15. To implement a Binary Search tree and perform the following:
 - a) Insert Element b) Preorder Traversal



Program: BTECH

Semester: Fourth

Course: Professional Practice, Law & Ethics

Course Code: HSMC202

L	T	P	C
3	0	0	3

Course Objective:

- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession.
- To develop some ideas of the legal and practical aspects of their profession.

Course Outcome:

- To familiarise the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession
- To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement of labour
- To give an understanding of Intellectual Property Rights, Patents.
- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
- To develop good ideas of the legal and practical aspects of their profession



Course Content:

Topics	Hours
Module 1: Professional Practice & Professional Ethics	
<p>Professional Practice – Respective roles of various stakeholders: Government (constituting regulatory bodies and standardization organizations, prescribing norms to ensure safety of the citizens); Standardization Bodies (ex. BIS, IRC)(formulating standards of practice); professional bodies (ex. Institution of Engineers(India), Indian Roads Congress, IIA/ COA, ECI, Local Bodies/ Planning Authorities) (certifying professionals and offering platforms for interaction); Clients/ owners (role governed by contracts); Developers (role governed by regulations such as RERA); Consultants (role governed by bodies such as CEAI); Contractors (role governed by contracts and regulatory Acts and Standards); Manufacturers/ Vendors/ Service agencies (role governed by contracts and regulatory Acts and Standards)</p> <p>Professional Ethics – Definition of Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics; Code of Ethics as defined in the website of Institution of Engineers (India); Profession, Professionalism, Professional Responsibility, Professional Ethics; Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistleblowing, protected disclosures.</p>	08
Module 2: General Principles of Contracts Management	
<p>Indian Contract Act, 1972 and amendments covering General principles of contracting; Contract Formation & Law; Privacy of contract; Various types of contract and their features; Valid & Voidable Contracts; Prime and sub-contracts; Joint Ventures & Consortium; Complex contract terminology; Tenders, Request For Proposals, Bids & Proposals; Bid Evaluation; Contract Conditions & Specifications; Critical /“Red Flag” conditions; Contract award & Notice To Proceed; Variations & Changes in Contracts; Differing site conditions; Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Liquidated damages & Penalties; Insurance & Taxation; Performance and Excusable Non-performance; Contract documentation; Contract Notices; Wrong practices in contracting (Bid shopping, Bid fixing, Cartels); Reverse auction; Case Studies; Build-Own-Operate & variations; Public-Private Partnerships; International Commercial Terms</p>	06
Module 3: Dispute Resolution Mechanisms	
<p>Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal – appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision; Enforcement of foreign awards – New York and Geneva Convention Awards; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats</p>	07
Module 4: Labour & other Laws	
<p>Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen’s Compensation Act, 1923; Building & Other Construction Workers (regulation of employment and</p>	04



Module 5: Intellectual Property Management

Meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970 including Concept and historical perspective of patents law in India, Patentable inventions with special reference to biotechnology products, Patent protection for computer programs, Process of obtaining patent – application, examination, opposition and sealing of patents, Patent cooperation treaty and grounds for opposition, Rights and obligations of patentee, Duration of patents – law and policy considerations, Infringement and related remedies

05

Text/Reference Books:

- B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.
- The National Building Code, BIS, 2017
- RERA Act, 2017
- Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
- Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
- Avtarsingh (2002), Law of Contract, Eastern Book Co.
- Dutt (1994), Indian Contract Act, Eastern Law House
- Anson W.R. (1979), Law of Contract, Oxford University Press
- Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council of Arbitration
- Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.



Program: BTECH
Semester: Fourth
Course: Entrepreneurship
Course Code: HSMC203

L	T	P	C
3	0	0	3

Course Objective:

- To develop an understanding of the concepts of project, types of projects, project identification, and Project's life cycle, Forms of Project Organization and human aspects of Project Management.
- To help students understand the importance of social cost and benefit analysis and its UNIDO approach. It also includes network technique for project management, scheduling, PERT, CPM model and network cost system.
- To incorporate the understanding of capital budgeting of an organization, including discounted and nondiscounted techniques, cost over- run, Project control and information system.
- To enable learners to understand the Significance of entrepreneurship in economic development qualities of entrepreneur, Entrepreneurship development programs and role of various institutions in developing entrepreneurship, life cycles of new business and steps for setting up a new industry.

Course Outcome:

On completion of the Course, the students will be able to:

CO 1: Understand the Concept of project, characteristics of projects, Identify the type of project and Project's life cycle, as well as steps for Successful Project Implementation.

CO 2: Analyse the project from technical, financial, market- demand and economic feasibility and analyse the difference between the CBA and SCBA. Create and formulate linear programming and integer programming model, project network and estimation of time and critical path in PERT and CPM model.

CO 3: Evaluate capital budgeting system of an organization through discounted and non-discounted techniques like NPV, IRR, Profitability index, ARR and Payback period.

CO 4: Understand entrepreneurship Development and role of institution like SIDO, MDI, EDI, AISSIB, NIESBUD etc. Also the students will analyze all the factors for success and failure of a new business.



Course Content:

Topics	Hours
Module 1: Introduction to Project Management	
Concept, characteristics of projects, types of projects, project identification, and Project's life cycle, Forms of Project Organization, Human Aspects of Project Management, Pre-requisites for Successful Project Implementation	04
Module 2: Project Feasibility	
Market feasibility, technical feasibility, financial feasibility, and economic feasibility, social cost-benefit analysis, project risk analysis Network Analysis, Requirements for Network Analysis, Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT)	08
Module 3: Financial appraisal/evaluation techniques	
Estimation of Cash Flows, discounted/non-discounted cash flows; Net present values, profitability index, Internal rate of returns; Cost benefits ratio; Accounting rate of return, Payback period, Project implementation; Cost overrun, Project control and information system	08
Module 4: Entrepreneurship Development	
Significance of entrepreneurship in economic development qualities of entrepreneur, entrepreneurship development programs and role of various institutions in developing entrepreneurship, life cycles of new business, environmental factors affecting success of a new business, reasons for the failure and visible problems for business, Developing effective business plans, Procedural steps in setting up of an industry	10

Suggested Reading:

- Chandra P. 2005. Project Management. Tata McGraw Hill.13
- Gopal Krishan P & Nagarajan K. 2005. Project Management. New Age.
- Hisrich RD & Peters MP. 2002. Entrepreneurship. Tata McGraw Hill.
- Kaplan JM. 2003. Patterns of Entrepreneurship. John Wiley & Sons.
- Nandan H. 2007. Fundamentals of Entrepreneurship Management. Prentice Hall.
- Ramamoorthy VE. 2005. Textbook of Project Management. MacMillan



Program: BTECH

Semester: Fourth

Course: Disaster Management**

Course Code: MC201

L	T	P	C
2	0	0	0

Course Objective:

- Develop an understanding of the key concepts, definitions a key perspectives of All Hazards Emergency Management
- Understand the Emergency/Disaster Management Cycle
- Have a basic understanding for the history of Emergency Management
- Develop a basic under understanding of Prevention, Mitigation, Preparedness, Response and Recovery
- Develop a basic understanding for the role of public a private partnerships.

Course Outcome:

- CO1:** Understanding foundations of hazards, disasters and associated natural/social phenomena.
- CO 2:** Familiarity with disaster management theory (cycle, phases)
- CO 3:** Knowledge about existing global frameworks and existing agreements (e.g. Sendai)
- CO 4:** Methods of community involvement as an essential part of successful DRR.



Course Content:

Topics	Hours
Module 1:	
Understanding Disasters: Understanding the concepts and definitions of disaster, hazard, vulnerability, risk, importance, dimensions & scope of Disaster Management, Disaster Management cycle and disaster profile of India.	04
Module 2:Project Feasibility	
Types, Trends, Causes, Consequences and Control of Disaster: Geological Disasters (earthquakes, landslides, tsunami, mining);Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves); Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear, bomb threat, explosion) and Man-made Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters; terrorist attack, , sudden shooting);Global Disaster Trends–Emerging Risks of Disasters–Climate Change and Urban Disasters; Financial emergency(risk of eviction, risk in arrears, sudden health emergency, family emergency, unexpected loss of income).	08
Module 3:	
Prevention and Mitigation of Disaster :Disaster Mitigation: meaning and concept, Disaster Mitigation Strategies Emerging Trends in Disaster Mitigation, Mitigation management, Role of Team and Coordination. Disaster Preparedness: Concept & Nature, Disaster Preparedness Plan, Preventions. Roles & Responsibilities of Different Agencies and Government, Technologies for Disaster Management. Early Warning System; Preparedness, Capacity Development; Awareness during Disaster.	08
Module 4:	
Applications of Science and Technology for Disaster Management & Mitigation: Geo-informatics in Disaster Management (RS, GIS, GPS and RS) Disaster Communication System (Early Warning and Its Dissemination) Land Use Planning and Development, Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters.	10

Suggested Reading:

1. Disaster Management- J. P. Singhal, Laxmi Publications.
2. Disaster Management - Dr. Mrinalini Pandey, Wiley India Pvt. Ltd.
3. Disaster Science and Management- Tushar Bhattacharya, McGraw Hill Education (India) Pvt. Ltd.
4. Disaster Management: Future Challenges and Opportunities - Jagbir Singh, K W Publishers Pvt. Ltd.

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Program: MCA**Semester:** Third**Course:** Artificial Intelligence and Applications**Course Code:** 3CIT201

L	T	P	C
4	0	0	4

Course Objectives:

Students will be able to

- Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
- Experiment with a machine learning model for simulation and analysis.
- Explore the current scope, potential, limitations, and implications of intelligent systems.
- Solve problems using search techniques: depth-first, breadth-first, forward chaining, backward chaining, best-first, branch-and-bound, and-or-graph, and heuristic search.

Course Outcomes:

After the successful completion of the course, the students will be able to:

- Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
- Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
- Acquire the knowledge of real world Knowledge representation.
- Use different machine learning techniques to design AI machine and enveloping applications for real world problems

Ashwini Anand Dr. Rajendra P. Ashwin

Course Content:

Topics	Hours
Unit I	
Scope of AI Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques-search knowledge, abstraction. Problem solving State space search: Production systems. Search space control: Depth first, breadth first search, heuristic search - Hill climbing, best first search, branch and bound. Minimax search: Alpha-Beta cut offs.	10
Unit II	
Knowledge Representation Predicate Logic: Skolemizing queries, Unification. Modus ponens. Resolution, dependency directed backtracking. Rule Based Systems: Forward reasoning: Conflict resolution. Backward reasoning: Use of no backtrack. Structured Knowledge Representations: Semantic Net: slots, exceptions and defaults Frames	12
Unit III	
Handling uncertainty Probabilistic reasoning. Use of certainty factors. Fuzzy logic.	6
Unit IV	
Learning Concept of learning, learning automation, genetic algorithm, learning by induction, neural nets back propagation. Expert Systems Need and justification for expert systems. Knowledge acquisition. Case studies: MYCIN, RI.	12

Suggested Readings:

- Nilsson, N.J., "Principles of AP", Narosa Publishing House, 1990.
- Patterson, D. W., "Introduction to AI and Expert Systems", Prentice Hall of India, 1992.

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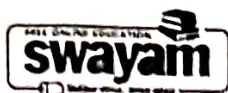
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- Peter Jackson, "Introduction to Expert Systems", Addison Wesley Publishing Company, M.A., 1992. Rich, E., and Knight, K., "Artificial Intelligence", Tata McGraw Hill (2nd Edition), 1992.
- Schalk off, R.J., "Artificial Intelligence • An Engineering Approach", McGraw Hill International Edition, Singapore, 1992.
- Sasikumar, M., Ramani, S., "Rule Based Expert System", Narosa Publishing House, 1994.

Ashwini Anand Dr Rajanikant D Ashish Jyoti



(https://swayam.gov.in/)



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About Swayam (https://swayam.gov.in/about) | All Courses | anuradha.sharma80@yahoo.com (/profile)

Courses (https://swayam.gov.in/explorer) >

Fundamentals Of Artificial Intelligence

By f. Shyamanta M. Hazarika | IIT Guwahati

Go to course (course?user_email=anuradha.sharma80@yahoo.com) Learners enrolled: 10621



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ABOUT THE COURSE:

What does automatic scheduling or autonomous driving have in common with web search, speech recognition, and machine translation? These are complex real-world problems that span across various practices of engineering! Aim of artificial intelligence (AI) is to tackle these problems with rigorous mathematical tools. The objective of this course is to present an initiative by : Ministry of Education (Govt of India)

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- Week 1: AI and  (<https://swayam.gov.in/>)  (https://swayam.gov.in/nc_details/NPTEL)
- Week 2: Problem Solving by Search
- Week 3: Problem Solving by Search
- Week 4: Knowledge Representation and Reasoning
- Week 5: Knowledge Representation and Reasoning
- Week 6: Knowledge Representation and Reasoning
- Week 7: Reasoning under Uncertainty
- Week 8: Planning
- Week 9: Planning and Decision Making
- Week 10: Machine Learning
- Week 11: Machine Learning
- Week 12: Machine Learning

Books and references

1. Patrick Henry Winston, Artificial Intelligence, Third Edition, Addison-Wesley Publishing Company, 2004.
2. Nils J Nilsson, Principles of Artificial Intelligence, Illustrated Reprint Edition, Springer Heidelberg, 2014.
3. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 3rd Edition, PHI 2009.
4. Nils J. Nilsson, Quest for Artificial Intelligence, First Edition, Cambridge University Press, 2010.

Instructor bio



Prof. Shyamanta M. Hazarika

IIT Guwahati

Shyamanta M Hazarika is a Professor of Mechanical Engineering at IIT Guwahati and leads the Biomimetic Robotics and Artificial Intelligence Lab. His research interest is in Rehabilitation Robotics. This translates into interest in Artificial Intelligence, Biomimetic Robotics and Robotic Neurorehabilitation. Prior to joining IIT Guwahati, he was with the Department of Computer Science and Engineering, Tezpur University. He has been a Vertretungsprofessur of Cognitive Systems and Neuroinformatics, University of Bremen, Germany. Prof. Hazarika holds a B.E. in Mechanical Engineering from Assam Engineering College, Guwahati, India; M.Tech. in Robotics from Center for Robotics, IIT Kanpur, India. He completed his PhD in Artificial Intelligence (Knowledge Representation and Reasoning) from School of Computing, University of Leeds, England.

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The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.

About Swayam (<https://swayam.gov.in/about>) | All Courses | anuradha.sharma80@yahoo.com ✓ (/profile)

The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).

Date and Time of Exams: 29 October 2022 Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.

Registration url: Announcements will be made when the registration form is open for registrations.

The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.

Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.

Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE $\geq 10/25$ AND EXAM SCORE $\geq 30/75$. If one of the 2 criteria is not met, you will not get the certificate even if the Final score $\geq 40/100$.

Certificate will have your name, photograph and the score in the final exam with the breakup. It will have the logos of NPTEL and IIT Guwahati. It will be e-verifiable at nptel.ac.in/noc (<http://nptel.ac.in/noc>).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

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Rajankit

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Ashame Anand



Program: BCA**Semester:** Third**Course:** Community Engagement and Social Responsibility**Course Code:** MC201

L	T	P	C
1	0	2	2

Course Objective:

CLO 1: To develop an appreciation of rural culture, life-style and wisdom amongst students.

CLO 2: To learn about the status of various agricultural and rural development programmes.

CLO 3: To understand causes for rural distress and poverty and explore solutions for the same.

CLO 4: To apply classroom knowledge of courses to field realities and thereby improve quality of learning.

Course Outcomes:

On the completion of the Course, the students will be able to:

CO 1: Gain an understanding of rural life, culture and social realities.

CO 2: Develop a sense of empathy and bonds of mutuality with local community.

CO 3: Appreciate significant contributions of local communities to Indian society and economy.

CO 4: Learn to value the local knowledge and wisdom of the community.

CO 5: Identify opportunities for contributing to community's socio-economic improvements.

Course Content:

Topics	Hours
Unit I: Appreciation of Rural Society	8
Rural life style, rural society, caste and gender relations, rural values with respect to community, nature and resources, elaboration of "soul of India lies in villages" (Gandhi), rural infrastructure.	
ASSIGNMENT: Prepare a map (physical, visual or digital) of the village you visited and write an essay about inter-family relations in that village.	
Unit II: Understanding rural economy & livelihood	
Agriculture, farming, landownership, water management, animal husbandry, non-farm livelihoods and artisans, rural entrepreneurs, rural markets.	
ASSIGNMENT: Describe your analysis of rural household economy, its challenges and possible pathways to address them.	
Unit III: Rural Institutions	8
Traditional rural organisations, Self-help Groups, Panchayati raj institutions (Gram Sabha, Gram Panchayat, Standing Committees), local civil society, local administration.	
ASSIGNMENT: How effectively are Panchayati raj institutions functioning in the village? What would you suggest to improve their effectiveness? Present a case study (written or audio-visual)	

Ashams
 Anil D. Rajankar
 Dr. Ashish B. J.

Unit IV: Rural Development Programmes

History of rural development in India, current national programmes: Sarva Shiksha Abhiyan, Beti Bachao, Beti Padhao, Ayushman Bharat, Swachh Bharat, PM Awaas Yojana, Skill India, Gram Panchayat Decentralized Planning, NRLM, MNREGA, etc

8

ASSIGNMENT: Describe the benefits received and challenges faced in the delivery of one of these programmes in the rural community; give suggestions about improving Implementation of the programme for the rural poor.

Suggested Readings:

1. Singh, Katar, Rural Development : Principles, Policies and Management, Sage Publications, New Delhi, 2015.
2. A Hand book on Village Panchayat Administration, Rajiv Gandhi Chair for Panchayati
3. Raj Studies, 2002.
4. United Nations, Sustainable Development Goals, 2015 un.org/sdgs/
5. M.P.Boraian, Best Practices in Rural Development, Shanlax Publishers, 2016

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Program: B.Tech CSE

Semester: Third

Course: Community Engagement and Social Responsibility

Course Code: MC201

L	T	P	C
1	0	2	2

Course Objective:

CLO 1: To develop an appreciation of rural culture, life-style and wisdom amongst students.

CLO 2: To learn about the status of various agricultural and rural development programmes.

CLO 3: To understand causes for rural distress and poverty and explore solutions for the same.

CLO 4: To apply classroom knowledge of courses to field realities and thereby improve quality of learning.

Course Outcomes:

On the completion of the Course, the students will be able to:

CO 1: Gain an understanding of rural life, culture and social realities.

CO 2: Develop a sense of empathy and bonds of mutuality with local community.

CO 3: Appreciate significant contributions of local communities to Indian society and economy.

CO 4: Learn to value the local knowledge and wisdom of the community.

CO 5: Identify opportunities for contributing to community's socio-economic improvements.

Course Content:

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ASSIGNMENT: Prepare a map (physical, visual or digital) of the village you visited and write an essay about inter-family relations in that village.	
Unit II: Understanding rural economy & livelihood	
Agriculture, farming, landownership, water management, animal husbandry, non-farm livelihoods and artisans, rural entrepreneurs, rural markets.	
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History of rural development in India, current national programmes: Sarva Shiksha Abhiyan, Beti Bachao, Beti Padhao, Ayushman Bharat, Swachh Bharat, PM Awaas Yojana, Skill India, Gram Panchayat Decentralized Planning, NRLM, MNREGA, etc

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3. A Hand book on Village Panchayat Administration, Rajiv Gandhi Chair for Panchayati
4. Raj Studies, 2002.
5. United Nations, Sustainable Development Goals, 2015 un.org/sdgs/
6. M.P.Boraian, Best Practices in Rural Development, Shanlax Publishers, 2016

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Dr. Rajanki II
Ashep
Dr. Rajanki II
Ashep



Managing Personal Finances

Course Objectives:

The main objective of the course is to provide students with basic financial tools & knowledge that enables them

- To develop the understanding of basic human resource management to step into the corporate world.
- To develop a workable budget, create a personal balance sheet and plan to connect money management techniques to a financial goal
- Identify and evaluate the variety of investment opportunities and make investment decision as per the personal financial needs
- Identify types of risks and risk management methods, and develop a risk management plan, including health care, motor vehicle, disability and life insurance
- To develop strategies for building & maintaining good Credit
- To develop understanding of tax implications & computation of Income tax.

Unit I: Basics to step into the Corporate World

Overview of Joining Formalities, Induction, Difference between Offer Letter & Appointment Letter, Components of CTC, Deductions & Claims, Types of Leave, Types of Separation, Exit Procedure.

Unit II: Savings, Budgeting & Fundamentals of Investment

Understanding Personal Finance, Managing Cash Flows, Preparing Personal Budget, Tips for tracking & Saving Money, Importance of Bargain shopping & Negotiation strategies

Identification of Investment Need; Short term & Long term Investment products: Capital Market, Money Market, Commercial Banks, Post Office Schemes; Mutual Funds: Types of Schemes, Concept of SIP's, Fees & Charges; Planning & saving for Retirement; Risk Management through Insurance: Basics of Insurance, Types of Insurance policies, Understanding terms & provisions of Insurance Policy

Unit III: Building & Maintaining Good Credit

Setting Debt Limit, Credit approval process & elements of Credit Score, Sources of Consumer Loan, Calculating Interest on Consumer Loans, Types of Credit Card, Managing Credit Cards: Computation of Finance Charges & Credit card average daily balance

Unit IV: Managing Income Taxes

Basics of Income Tax for beginners, Government Benefits, Deductions available for salaried employees, HRA Exemptions, Calculation of Tax payable, Tax Deduction at Source, Procedure for filing ITR, Applicable Forms, Basics of GST

Suggested Readings:

- Human Resource Management- Gary Dessler, PHI, New Delhi
- Human Resource and Personnel Management- Aswathappa K, (Tata McGraw Hill, 5th Ed.).
- Personal Finance, Kapoor-Dlabay-Hughes, 8e New York: The McGraw-Hill Companies, 2007
- Retire Rich: Invest Rs 40 a Day, P.V.Subramanyam, New Edition, TV18
- Financial Management - Pandey I M ,(Vikas, 2004, 9th Ed.)
- Financial Management- Ravi M. Kishore (Taxmann, 1st Ed.)
- Tax Planning by Reports, Santaram R - (Taxmann, 1978).
- Direct Taxes, Law & Practice, Singhanian V K - (Taxmann, 40thEd.)

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Regarding Tutorial Class of Biological Science for Engineers

1 message

Anuradha Sharma <anuradha.sharma@jru.edu.in>

Sat, Sep 17, 2022 at 2:52 PM

To: Ashish Sinha <ashish.sinha@jru.edu.in>, RAJAN TIWARI <ranjan.tiwari@jru.edu.in>

Cc: KUMAR AMRENDRA <kumar.amrendra@jru.edu.in>, SHRADDHA PRASAD <shraddha.prasad@jru.edu.in>, PIYUSH RANJAN <piyush.ranjan@jru.edu.in>

Dear All,

Kindly find the attached Tutorial Class schedule of Biological Science for Engineers for B.Tech CSE IIIrd Semester.

One class is scheduled in a week on Monday, from 3:15 to 4:15 PM.

B.Tech CSE III		
Tutorial Class Schedule		
Biological Science for Engineers		
Sl. No.	Date	Concerned Faculty
1	19.9.2022	Rajan Kumar Tiwari
2	26.9.2022	Ashish Kumar Sinha
3	10.10.2022	Rajan Kumar Tiwari
4	17.10.2022	Ashish Kumar Sinha
5	7.11.2022	Rajan Kumar Tiwari
6	14.11.2022	Ashish Kumar Sinha
7	21.11.2022	Rajan Kumar Tiwari
8	28.11.2022	Ashish Kumar Sinha
9	5.12.2022	Rajan Kumar Tiwari
10	12.12.2022	Ashish Kumar Sinha
11	19.12.2022	Rajan Kumar Tiwari
12	26.12.2022	Ashish Kumar Sinha

—
Regards,
Anuradha Sharma
Assistant Professor,
Department of Computer Science and Information Technology
Jharkhand Rai University, Ranchi

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Ashish *Anuradha* *Rajan K P* *Ashish* *SR* *SR*

Time Table -Fall 2022

Department of CS&IT

B.Tech CSE III (319 AN)

Program	Room No.	8:15-9:15	9:15-10:15	10:15-11:15	11:15-12:15	12:15-1:15	1:15-2:15	2:15-3:15	3:15-4:15	4:15-5:15
Monday										
B.TECH CSE III	319AN			ETC - AS(204)	DSA LAB - SS	DSA LAB - SS	LUNCH	Meeting Section - ANU & SS	SSS-Tutorial-ETC/AS	
Tuesday										
B.TECH CSE III	319AN			ETC - AS(204)	CEASR - OP(204)	COA LAB - RKT	COA LAB - RKT	LUNCH	AFC - Pkya	DSA - SS
Wednesday										
B.TECH CSE III	319AN					LUNCH	COA - RKT	BSE - AB	DSA - SS	BSE - AB
Thursday										
B.TECH CSE III	319AN					LUNCH	DSA - SS	AFC - Pkya	Mahu III - SKS	COA - RKT
Friday										
B.TECH CSE III	319AN					LUNCH	Mahu III - SKS	AFC - Pkya	BSE - AB	COA - RKT
Saturday										

Faculty Name	Faculty Code
Prof. Anuradha Sharma	ANU
Prof. Kumar Amrendra	KA
Prof. Rajan Kumar Tewari	RKT
Dr. Ashish Kumar Shiba	AKS
Mr. Shivrajni Bhatti	SB
Prof. Rashmi	RA
Prof. Rashmi Rajan	R.Rajan
Prof. Shaibankumar	SS
Prof. V.A.J. Kumar	WK
Prof. Sangita Singh	Singhita
Prof. Anita Singh	AS
Prof. Saurav Kumar Sharma	SKS
Prof. Riddha Chaudra	RC
Prof. Apurva Bhardwaj	AB
Prof. Priya	Priya