B.Tech. (Information Technology)
Draft Course Structure for B.Tech. (Information Technology) w.e.f. Academic Year 2022-23 Admitted

Sem-III

Sr. No.	Course Code	Course Title	L_T_P	Credits	Contact Hrs
1.	MAIC 201	Mathematics III	3 1 0	4	4
2.	ITPC 201	Design and Analysis of Algorithms	3 0 2	4	5
3.	ITPC 203	Computer Organization and Architecture	3 0 0	3	3
4.	ITPC 205	Object-Oriented Programming using Java	3 0 2	4	5
5.	ITPC 207	Software Engineering	3 0 2	4	5
6.	ITPC 209	IoT Programming #	1 0 2	2	3
7.	SWNC101	NCC/Sports/Yoga	0 0 4	1*	2*
8.	SWNC102	NSS/Club/Technical Societies	0 0 4	1*	2*
		Total		**21**	**25**

 # To be treated as a practical course (not integrated), evaluation will be as per practical course.

Sem-IV

Sr. No.	Course Code	Course Title	L_T_P	Credits	Contact Hrs
1.	ITPC 200	Operating Systems	3 0 2	4	5
2.	ITPC 202	Computer Networks	3 0 2	4	5
3.	ITPC 204	Artificial Intelligence and Soft Computing	3 0 2	4	5
4.	ITPE XXX	**Department Elective – I**	3 0 2	4	5
5.	ITPC 206	Database Management Systems	3 0 2	4	5
6.	SWNC101	NCC/Sports/Yoga	0 0 4	1*	2*
7.	SWNC102	NSS/Club/Technical Societies	0 0 4	1*	2*
		Total		**20**	**25**

Sr. No.	Course Code	Department Elective – I Course Titles
1.	ITPE 210	Software Development using UML and Agile Methodology
2.	ITPE 212	Competitive Programming and Efficient Coding
3.	ITPE 214	Scripting Languages

Course Code MAIC 201	Discrete Mathematics and Statistical Methods (For CS, IT and AI & ML)	L - T - P - C 3 - 0 - 0 - 3

Course Objectives:

1. To give the students deeper knowledge about Probability andDistributions.

2. To study the topics of discrete mathematics with engineeringapplications.

3. To apply graph theory based tools in solving practical problems.

4. To impart knowledge about Statistical Methods.

Unit 1: 8L

Discrete Probability: Basic definitions, Engineering applications of probability, Set theory, Probability Multiplications principle, Prod- uct of sums principle, Cross product of sample spaces, Theorem of Total Probability, Conditional Probability, Mutual Exclusion and In- dependent Events, Principle of Inclusion and Exclusion, Bayes' Rule.

Unit 2: 8L

Discrete Random Variable & Probability Distributions: Ran- dom variables and their event spaces, Probability Mass function, Distribution function, Mean and Variance of random variables, Ex- pected value of a random variable & Computation of expectation for one variable, Bernoulli's Trials & Binomial distribution, Poisson distribution, Normal distribution, Recurrence relation and their so-lutions.

Unit 3: 8L

Graphs: Basic Terminology, Multigraphs and Weighted Graphs, Paths and Circuits, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, Planar Graphs.

Unit 4: 8L

Relations and Prepositions: Binary Relations and their proper- ties, Equivalence relations and partitions, Partial ordering relations, Linear ordering relations, Chains, Functions and Pigeonhole princi-ple, Propositions.

Unit 5: 8L

Statistical Methods: Large sample tests- Procedure of testing hy- pothesis, Small sample tests, Student's T-test, Chi-Square test, In- dependence of attributes and goodness of fit.

Text Books:

1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists, PHI,2nd Edition, 2008.
2. J. P. Tremblay and R Manohar, Discrete Mathematical Struc- tures with Applications to Computer Science, 1st Edition, TataMcGraw Hill, 2001.
3. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Key- ing Ye, Probability and Statistics for Engineers and Scientists, 9th Edition, 2012.

Reference Books:

1. Kolman, Bubby Ross, Discrete Mathematics Structures, 3rdEdition, PHI, 2001.
2. C.L. Liu, Elements of Discrete Mathematics, 2nd Edition, TataMcGraw Hill, 1985.
3. Gary Haggard, J. Schlipf, S. Whitesides, Discrete Mathematicsfor Computer Science, Cengage Learning,1st Edition, 2005.

B.Tech. (Information Technology)

Course Code	:	ITPC 201
Course Title	:	Design and Analysis of Algorithms
Number of Credits and L/T/P scheme	:	4 & 3/0/2
Prerequisites (Course code)	:	
Course Category	:	PC

Course Learning Objectives:
1. Able to design, implement and analysis of standard searching and sorting algorithms.
2. Implement standard divide and conquer, Dynamic programming, Greedy and backtracking algorithms.
3. Able to implement between different data structures i.e., trees, heaps etc. also, able to pick an appropriate data structure for any given design situation.
4. Able to implement the major graph algorithms and their analysis.

Course Content:
1. Introduction
Concept of Time and space complexity, analysis of algorithms, asymptotic notation, recurrence relations, design and analysis of D & C problems like quick sort etc, heap sort, priority queues, sorting in linear time, hashing, binary search trees.

2. Graph Algorithms
Graph representation & traversal (search), topological sort, strongly connected components, minimum spanning trees – Kruskal and Prim's, Single source shortest paths, relaxation, Dijkstra's algorithm, Bellman-Ford algorithm, single source shortest paths for directed acyclic graphs, all-pairs shortest path.

3. B-Trees and Dynamic programming
B-Trees: representation and operations; Elements of Dynamic Programming, structure and steps, Matrix-chain multiplication, longest common subsequence.

4. Greedy & Backtracking Approaches:
Greedy algorithms – Elements, activity-selection problem, Huffman codes, task scheduling problem, Knapsack Problem, Backtracking – Elements, 8 – Queens, Graph Coloring, Hamiltonian Cycles.

Text Books:
1. Cormen, Leiserson and Rivest: Introduction to Algorithms, 3/e, PHI.
2. Horowitz, Sahni, and Rajasekaran: Fundamentals of Computer Algorithms, Second Edition, Universities Press, Hyderabad.
3. Aho, Hopcroft, and Ullman: The Design and Analysis of Computer Algorithms, Addison Wesley.

Course Outcomes
1. Able to design, implement and analysis of standard searching and sorting algorithms.
2. Implement standard divide and conquer, Dynamic programming, Greedy and backtracking algorithms.
3. Able to implement between different data structures i.e., trees, heaps etc. also, able to pick an appropriate data structure for any given design situation.
4. Able to implement the major graph algorithms and their analysis.

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Course Code	:	ITPC 203
Course Title	:	Computer Organization and Architecture
Number of Credits and L/T/P scheme	:	4 & 3 1 0
Prerequisites	:	Digital System Design
Course Category	:	PC

Course Learning Objectives:
1. Working of Computer Systems & its basic principles.
2. Concepts of processor and control design.
3. Concepts of pipelining techniques.
4. Memory hierarchy and its organization.
5. Concept of I/O devices and working.

Course Content:
1. **Introduction**

   Introduction to digital electronics: combinational circuits and sequential circuits. Basic Machine Principle, Structure and representation of real world data. Subroutine, Branching & Macro facility.
2. **Processor Design**

   Processor Organization, Information representation and Number format, Instruction cycle and Instruction format, Addressing modes, Arithmetic operation, timed point addition, subtraction, multiplication and division, ALU design, Parallel processing – Performance consideration, Pipeline processor.
3. **Control Design**

   Instruction sequencing and Interpretation, Hardware Control design method and Microprogrammed Control.
4. **Memory organization**

   Memory device characteristic, Random access and serial access memories, Virtual memory – memory hierarchies, Page replacement policies, Segments, pages and file organization, High speed memories – cache and associative memory.
5. **System Organization**

   Programmed I/O, DMA and interrupts, I/O processors & CPU – I/O interaction.

Text Books:
1. John L. Hennessy , David A. Patterson: Computer Architecture: A Quantitative Approach, Sixth Edition, Morgan Kaufmann.
2. Kai Hwang: Computer Architecture and Parallel Processing, McGraw Hill Education.M.M. Mano: Computer System Architecture, 3rd Ed. PHI.
3. J.P. Hayes: Computer Architecture and Organization, 3rd Ed. TMH,
4. C.W. Gear: Computer organization and Programming, TMH.
5. A.S. Tanenbaum: Computer System Organization, PHI

Course Outcomes:
At the end of the course student will be able to……
1. Understand the Computer System concepts.
2. Understand the organization of a computer system in terms of its main components.
3. Understand the processor and control design of a computer system.
4. Understand the various types of memory.
5. Understand input/output mechanisms.

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Course Code	:	ITPC 205
Course Title	:	Object-Oriented Programming using Java
Number of Credits and L/T/P scheme	:	4 & 3 1 0
Prerequisites	:	
Course Type	:	PC

Course Learning Objectives:
1. Building robust applications using Java's object-oriented features.
2. Understanding the usage of java class libraries.
3. Building multithreaded, platform-independent and GUI based java applications for business problems.

Course Content:
1. The overview of Java's architecture and the architecture of the Java Virtual Machine (JVM).
   Classes: Declaring Members (Fields and Methods), Instance Members, Static Members.
   Objects: Class Instantiation, Reference Values, and References, Object Aliases. Basic Language Elements, Primitive Data Types, Variable Declarations, Initial Values for Variables, Class Declarations, Method Declarations, this reference, Method Overloading, Constructors, The Default Constructor and Constructors overloading. Arrays, Anonymous Arrays, Multidimensional Arrays, Variable Arity Methods, The main() Method, Program Arguments.
2. **Packages:** Defining Packages, Using Packages, Compiling Code into Packages, Running Code from Packages. Scope Rules, Accessibility Modifiers, Overview of other Modifiers for Members.Operators and Expressions, Overview of Control Flow Statements.
   Exception Handling: The try Block, The catch Block, The finally Block, The throw Statement, The throws Clause, Checked and Unchecked Exceptions, Defining New Exceptions.

3. **Object-Oriented Programming:** Single Implementation Inheritance, Overriding Methods, Hiding Members, The Object Reference super, Chaining Constructors Using this() and super()
   Interfaces: Defining Interfaces, Abstract Method Declarations, Implementing Interfaces, Extending Interfaces, Interface References, Constants in Interfaces, Polymorphism and Dynamic Method Lookup.
   Fundamental Classes: Overview of the java.lang Package, The Object Class, The Wrapper Classes, The String Class, The StringBuilder and the StringBuffer Classes.

4. **Multithreading:** Overview of Threads, the Main Thread, Thread Creation, Synchronization, Thread Transitions. Basics of Event Handling, Graphics Programming using Java Fx.

Reference Books:
1. Y. Daniel Liang: Introduction to Java Programming, Comprehensive Version, Pearson Education, 12th Ed.
2. Bruce Eckel, Thinking In Java, Pearson Education, 4th Ed., 2006.
3. Dietel & Deitel, Java How to Program, Pearson Education, 10th Ed., 2015.
4. Kathy Sierra & Bert Bates, Head First Java, O'REILLY, 2nd Ed., 2005.
5. Cay s. Horstmann & Gary Cornell, Core Java. Volume I, Fundamentals, Sun Microsystems Press, 8th Ed., 2008.

Course outcomes:
1. Write Java programs that solve simple business problems.
2. Create Java applications that are robust and multithreaded.
3. Write simple GUI interfaces for a program to interact with users, and to understand the event-based GUI handling principles.

B.Tech. (Information Technology)

Course Code	:	ITPC 207
Course Title	:	Software Engineering
Number of Credits and L/T/P scheme	:	4&3/0/2
Prerequisites (Course code)	:	
Course Category	:	**PC**

Course Learning Objectives
1. To inculcate software design abilities.
2. Impart knowledge-based awareness of user requirements.
3. To enable the students to conduct feasibility analysis.
4. Knowledge of software quality testing for its sustainability, reliability and durability.

Course Content
1. **Introduction -** Software Crisis, Software Characteristics, and Software Processes; Software life cycle models – Build & Fix, waterfall prototype evolutionary, spiral model.

2. **Problem Analysis**- DFD, Data dictionaries, ER diagrams, object diagrams; approaches to problems analysis; SRS; specifying behavioral & non-behavioral requirements, software configuration management.

3. **Software Design and Implementation-** Modularity, strategy of design, function-oriented design, object-oriented design, User interface design, UML modelling, Software implementation.

4. **Software Quality-** Size metrics, data structure metrics, information flow metrics, entropy-based measures, metric analysis, Software Quality Frameworks, ISO 9001 Model, SEI-CMM Model.

5. **Software Validation and Reliability -** Software Testing, verification and validation, errors, failures, faults, fault tolerance, Software Maintenance, reliability models – macro, basic, logarithmic Poisson, calendar time component, micro models.

Text Books:
1. Pressman, R.S. and Maxim, B.R., Software Engineering: A Practitioner's Approach, 9th ed., McGraw Hill, 2020.
2. Sommerville, Ian, Software Engineering, 10th ed., Pearson Education 2017.
3. K.K.Aggarwal, Yogesh Singh: Software Engineering, New Age International Ltd, 2001.
4. Pankaj Jalote, An Integrated Approach to Software Engineering 3rd Ed., 2005 Narosa Publishing.

Reference Books:
1. Singh,Y.,Software Testing, Cambridge University Press, 2013.

Course Outcomes
At the end of the course, students will be able to
1. Apply the concepts to choose appropriate software process models as per user requirements
2. Analyze requirement techniques, including Data flow diagram, Entity relationship diagram, and Object diagram
3. Understand the various Software Design strategies for software implementation and emphasize different software metrics used for analyzing the software
4. Design and test the various software reliability measures to assess software quality in case of multiple faults and failures

Course Code	:	ITPC 209
Course Title	:	IoT Programming
Number of Credits and L/T/P scheme	:	2 & 1/0/2
Prerequisites (Course code) Programming on the Raspberry Pi	:	
Course Category	:	PC

Course Learning Objectives
1. Familiarity with sensors, actuators and microcontroller- based Arduino and Raspberry Pi platform.
2. Writing C programs in Arduino IDE.
3. Understanding of the Communication between microcontroller and PC using serial communication.
4. Knowledge of the design of IoT based applications.

Course Content
1. **Introduction to Internet of Things:** Applications/Devices, Protocols and Communication Model, the Physical Design/Logical Design of IoT, Functional blocks of IoT and Communication Models, Development Tools used in IoT.
2. **Things and Connections Working of Controlled Systems:** Real-time systems with feedback loop, Connectivity models, different type of modes using wired and wireless methodology.
3. **Sensors, Actuators and Microcontrollers Sensor:** Types of sensors, actuator and actuators controller, Microcontroller vs microprocessor, different types of microcontrollers in embedded ecosystem.
4. **Building IoT applications using Arduino:** Introduction to Arduino IDE, Embedded 'C' Language basics, interfacing sensors, interfacing LED, Button, Sensors-DHT, LDR, MQ135, IR.
5. **Building IoT applications using Raspberry Pi:** Raspberry Pi Hardware, Versions, Accessories, Precautions, Raspberry Pi Software – Operating System, Communicating and Connecting, Programming on the Raspberry Pi.

Text Books:
1. Macro Schwartz, "Internet of Things with Arduinon – Cookbook", Packt 2016
2. Arshdeep Bajga and Vijay Madisetti, "Internet of Things- A Hands-on Approach" Universities Press, 2014.
3. Derek Molloy, "Exploring Raspberry Pi: Interfacing to the Real World with Embedded Linux", John Wiley & Sons, 2016, ISBN: 978-1-119-18868-1
4. Yogesh Mishra, "Programming and Interfacing with Arduino", CRC Press, 2022, ISBN: 978-1-032-06316-4
5. Massimo Banzi, "Getting started with Arduino", 2nd Edition, Oreilly, 2011.
6. Macro Schwartz, "Internet of Things with Arduino", Open Home Automation.
7. Michael Margolis, "Arduino Cookbook", Oreilly, 2011.

Reference Books:
1. G. R. Kanagachidambaresan, "Internet of Things Using Single Board Computers: Principles of IoT and Python Programming", Apress, 2022 ISBN-13: 978-1-4842-8107-9
2. Jeff Cicolani, "Beginning Robotics with Raspberry Pi and Arduino Using Python and OpenCV", Second Edition, Apress, 2021, ISBN-13: 978-1-4842-6890-2
3. Olivier Hersent,David Boswarthick, Omar Elloumi, "The Internet of Things key applications and protocols", Wiley.
4. Adrian McEwen, Hakin Cassimally, "Designing the Internet of Things" Wiley India.
5. Michael Miller, "The Internet of Things" by Pearson.

Course outcomes:
1. Awareness of basic concepts, principles and challenges in IoT.
2. Understanding of the functioning of hardware devices and sensors used for IoT.
3. Ability to analyze network communication aspects and protocols used in IoT.
4. Apply IoT for developing applications using Ardunio programming.

Evaluation criterion for NCC Cadets

Following criterion is proposed to be adopted for the evaluation of NCC cadets for the practical course of NCC/NSS/Yoga

A: Internal Evaluation (During semester):

(i) Attendance: 20 marks

                                                    (for 90 % attendance full marks)

(ii) Discipline: 10 Marks

(iii) Drill performance & Body bearing: 10 marks

(iv) Participation in social activities: 10 marks

(v) Domain knowledge: 10 marks (Through oral viva)

B: End sem evaluation: (At the end of the semester)

(i) Discipline: 10 Marks

(ii) Drill performance & Body bearing: 15 marks

 (iv) Domain knowledge: 15 marks (Through oral viva)

C: After end of the 6th semester: Bonus marks 10 for each B & C certificate is proposed to be added in final marks subject to total marks does not exceed 100

NATIONAL CADET CORPS

INSTITUTIONAL TRAINING SYLLABUS

INTRODUCTION

1. Institutional Training being conducted in the Colleges and Schools is the principal means of training in the NCC. The aim of the training is to nurture core values, enhance awareness and give exposure to basic military skills and knowledge. Emphasis will be on practical training. Case studies, wherever possible will be used to facilitate active participation and better assimilation. Examples from India's freedom struggle and wars fought by India, post-independence, should supplement relevant subjects to generate secular and patriotic fervor. The instructors and the cadets must grasp the importance of this training and participate actively.

2. **Principles of Training:** In keeping with the changing environment, the principles of NCC Training are:
    (a)   Junior Division (JD)/Junior Wing (JW) to be for two years while Senior Division   (SD)/Senior Wing (SW) will be for three years.
    (b)   Separate syllabi for JD/JW and SD/SW.
    (c)   Modified, syllabus for professional educational institutes of repute to encourage   enrolment of cadets.
    (d)   Revised curriculum for training in a military environment with greater emphasis   on   soft   skill   development,   awareness   of   social responsibilities and adventure and   sports.
    (e)   Uniformity in syllabus for boys and girls.
    (f)   Common syllabus for all three wings to be approximately 60 to 70% and Specialised Service Syllabus training will be 30 to 40%.
    (g)   Emphasis on practical training.
    (h)   Conduct of periodic composite training ensuring continuity for better learning   assimilation and its application.

3. Common subjects will comprise about 70% of the periods and Specialised Service Subjects will be 30%. The breakdown of periods are as under:-

Sr. No.	Subject	No. of Periods			
		First Year	Second Year	Third Year	Total

Senior Division/Wing

(a)	Common Subject	66	72	72	210
(b)	Specilised Subject	24	33	33	90
	Total	**90**	**105**	**105**	**300**

Junior Division/Wing

(c)	Common Subject	85	85	170
			--NA—	
(d)	Specialised Subject	35	35	70
	Total	**120**	**120**	**240**

4.   In addition to this syllabus, **State Directorates** will conduct Social Service Activities in the form of rallies of any nature to carry social messages in the form of posters, street plays, placards etc.

Legend	
Abbreviation	Type
L	Lecture
D	Demonstration
DI	Discussion
P	Practice
V	Video

BLOCK SYLLABUS

COMMON SUBJECTS: SD/SW (ALL WINGS)

Sr. No.	Subject	1st Year	2nd Year	3rd Year	Total Periods
1.	The NCC	03	00	00	03
2.	National Integration and Awareness	06	06	06	18
3.	Drill	16	19	08	43
4.	Weapon Training	12	10	10	32
5.	Personality Development & Leadership	10	15	20	45
6.	Disaster Management	03	03	04	10
7.	Social Awareness & Community Development	05	05	06	16
8.	Health & Hygiene	05	04	07	16
9.	Adventure	02	06	07	15
10.	Environment Awareness and Conservation	02	02	02	06
11.	Obstacle Training	02	02	02	06
Total		**66**	**72**	**72**	**210**

BLOCK SYLLABUS
SPECIALISED SUBJECTS: SD/SW (ARMY)

Sr. No.	Subject	1st Year	2nd Year	3rd Year	Total Periods
1.	Armed Forces	04	04	02	10
2.	Map Reading	07	08	09	24
3.	Field Craft & Battle Craft	05	07	09	21
4.	Introduction to infantry Weapons & Equipment	02	04	05	11
5.	Military History	03	05	05	13
6.	Communication	03	05	03	11
Total		**24**	**33**	**33**	**90**

BLOCK SYLLABUS
SPECIALISED SUBJECTS: SD/SW (AIR)

Sr. No.	Subject	1st Year	2nd Year	3rd Year	Total Periods
1.	General Service Knowledge	02	02	02	06
2.	Air Compaigns	00	02	04	06
3.	Aircraft Recognition	00	04	00	04
4.	Modern Trends	00	00	02	02
5.	Principles of Flight	03	04	03	10
6.	Airmanship	06	02	02	10
7.	Navigation	00	03	02	05
8.	Meteorology	00	01	04	05
9.	Aero-Engines	01	04	01	06
10.	Airframes	02	02	02	06
11.	Instruments	02	03	02	07
12.	Aircraft Particulars	02	00	00	02
13.	Aeromodelling	06	06	09	21
Total		**24**	**33**	**33**	**90**

BLOCK SYLLABUS
SPECIALISED SUBJECTS: SD/SW (NAVY)

Sr. No.	Subject	1st Year	2nd Year	3rd Year	Total Periods
1.	Naval Orientation	08	06	03	17
2.	Naval Warfare and its Components	00	04	03	07
3.	Naval Communication	03	04	01	08
4.	Navigation	00	06	03	09
5.	Searmanship				
	(a) Anchor Work	01	01	00	02
	(b) Rigging	03	00	00	03
	(c) Boat Work	04	05	01	10
6.	Fire Fighting, Flodding and Damage Control	00	02	02	04
7.	Ship and Boat Modelling	02	03	14	19
8.	Search and Rescue	01	00	01	02
9.	Swimming	01	03	05	09
Total		**24**	**33**	**33**	**90**

		L	T/P	C
Course Code: SWNC101		0	4	2
Course Title: Sports				

Course Objective

Physical Education and Sports develop confidence, contributing to academic performance and mental health. Physical activity is a great way to relieve stress, promoting positive physical and mental health and enhanced learning aptitude. The class duration of 90 minutes will be divided into 02 segments comprising of Units 1 and 2.

- First 30 minutes of the class will be an interactive session where the students will be oriented and introduced to the different aspects of Physical Education and Sports.
- In the next 60 minutes of the class every students shall practice different skills and techniques of Athletics comprising of Track and Field events or any other specific games/sports of their choice.

Syllabus

Unit 1

Introduction to Physical Education
- Meaning & definition of Physical Education
- Aims & Objectives of Physical Education

Sports awards and honours
- Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

Olympic Movement
- Ancient & Modern Olympics (Summer & Winter)
- Olympic Symbols, Ideals, Objectives & Values

Physical Fitness, Wellness & Lifestyle
- Meaning & Importance of Physical Fitness
- Components of Physical fitness
- Components of Health related fitness Meaning & Importance of Wellness, Components of wellness
- Preventing Health Threats through Lifestyle Change
- Concept of Positive Lifestyle: Importance of Balance Diet etc.

Fundamentals of Anatomy & Physiology in Physical Education and Sports
- Define Anatomy, Physiology & Its Importance
- Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)

Kinesiology, Biomechanics & Sports
- Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports
- Biomechanical principles & its application in sports. (Laws of motion, Friction, Projectile etc.)

Postures
- Meaning and Concept of Postures.
- Causes of Bad Posture.
- Advantages & disadvantages of weight training.

- Concept & advantages of Correct Posture. Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis, Corrective Measures for Postural Deformities

Training and Planning in Sports

- Meaning of Training
- Warming up and limbering down
- Skill, Technique & Style

Psychology & Sports

- Definition & Importance of Psychology in Physical Edu. & Sports
- Define & Differentiate Between Growth & Development
- Adolescent Problems & Their Management
- Emotion: Concept, Type & Controlling of emotions
- Meaning, Concept & Types of Aggressions in Sports.

Doping

- Meaning and Concept of Doping
- Prohibited Substances & Methods
- Side Effects of Prohibited Substances

Sports Medicine

- First Aid – Definition, Aims & Objectives.
- Sports injuries: Classification, Causes & Prevention and Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries

Unit-2

(Practical-Sports Specific) Each student has to compulsorily opt for one game/sport so that he/she can be assessed on their performance in the same accordingly for all the 03 years.

Each student will be given practical knowledge about the basic fundamentals of various games and sports and Athletic Events be it Track or Field thereby developing the skill.

Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball etc.

1. History of the Game/Sport.
2. Latest General Rules of the Game/Sport.
3. Specifications of Play Fields and Related Sports Equipment.
4. Important Tournaments and Venues.
5. Sports Personalities.
6. Proper Sports Gear and its Importance

REFERENCE BOOKS:
1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Health and Physical Education – NCERT

Distribution of Marks: Total 100 (10+30+20+40)

1. Class Attendance / Punctuality –   10 marks
2. Active Participation Sports Related Activities -   30 marks
   (CITIUS, RUN FOR Unity, Prabhat Pheri etc.)
3. Viva/Subject Knowledge-   20 marks
4. Practical Exam at the end of 6th Sem (Modified Fitness Test)-   40 marks

Note – PWD Students will be exempted from taking part in physical activities and the Modified Physical Fitness Test.

Course Code: SWNC101   L   T/P   C
Course Title: Yoga   0   4   2

Introduction: Yog education in Institute can immensely contribute to health of children by disseminating knowledge and awareness about the value of health, inculcating and nurturing health promoting habits and life style.

Objectives of the course:
- To enable the student to have good physical and mental health.
- To improve cognitive ability.
- To improve the level of consciousness.

UNIT-I
Introduction to Yog
- ❖ Brief introduction to origin of Yog, Psychological aspects leading to origin of Yog, HinduMythological concepts about origin of Yog
- ❖ History and Development of Yog
- ❖ Etymology and Definitions of Yog, Aim and Objectives of Yog, Misconceptions about Yog, TrueNature of Yog
- ❖ General Introduction to Schools of Yog
- ❖ Principles of Yog, Yog Practices for Health and Harmony

UNIT-II
Yog and You
- ❖ **Concept of Health-** Aahaar, Nidra, Bharmacharaya, Viyayaam.
- ❖ **Aarogya -** Prevention, Cure and Remedies.
- ❖ Life Management and Development.

UNIT-III
Yog for Health Promotion –
- ❖ Brief introduction to human body
- ❖ Role of yog for health promotion
- ❖ Yogic attitudes and practices
- ❖ Holistic approach of yog towards the health and diseases
- ❖ Introduction to yog diet and its relevance and importance in yog Sadhana
- ❖ Dincharya and Ritucharya with respect of yogic lifestyle

UNIT-IV
Yog as Preventive measure for Lifestyle Disease
- ❖ **Obesity:** Procedure, Benefits & Contraindications for Tadasana, Katichakrasana, Pavanmuktasana, Matsayasana, Halasana, Pachimottansana, Ardha – Matsyendrasana, Dhanurasana, Ushtrasana, Suryabedhan pranayama.
- ❖ **Diabetes:** Procedure, Benefits & Contraindications for Katichakrasana, Pavanmuktasana,Bhujangasana, Shalabhasana, Dhanurasana, Supta-vajarasana, Paschimottanasana, Ardha-Mastendrasana, Mandukasana, Gomukasana, Yogmudra, Ushtrasana, Kapalabhati.
- ❖ **Asthma:** Procedure, Benefits & Contraindications for Tadasana, Urdhwahastottansana, UttanMandukasana, Bhujangasana, Dhanurasana, Ushtrasana, Vakrasana, Kapalbhati, Gomukhasana Matsyaasana, Anuloma-Viloma.

- ❖ **Hypertension:** Procedure, Benefits & Contraindications for Tadasana, Katichakransan, Uttanpadasana, Ardha Halasana, Sarala Matyasana, Gomukhasana, UttanMandukasana, Vakrasana, Bhujangasana, Makarasana, Shavasana, Nadishodhanapranayam, Sitlipranayam.

UNIT-V (Yogic Practice)

17

1. YOGIC SUKSMA VYAYAMA

Uccharana-sthalatatha Vishudha-chakra-shuddhi (for throat and voice)
Prarthana (Prayer)
Buddhi-tatha-dhritishakti-vikasaka (for developing will power)
Smaranashakti-vikasaka (for improving the memory)
Medhashakti-vikasaka (for improving the intellect and memory)
Netrashakti-vikasaka (for the eyes)
Kapolashakti-vardhaka (for the cheeks)
Karnashakti-vardhaka (for the ears)
Grivashakti-vikasaka (for the Neck)
Grivashakti-vikasaka (for the Neck)
Grivashakti-vikasaka (for the Neck)
Skandha-tatha-bahu-mulashakti-vikasaka (for the shoulders)
Bhuja-bandhashakti-vikasaka
Kohinishakti-vikasaka
Bhuja-vallishakti-vikasaka
Purna-bhujashakti-vikasaka (for the arms)
Mani-bandhashakti-vikasaka
Kara-prsthashakti-vikasaka
Kara-talashakti-vikasaka
Anguli-mulashakti-vikasaka (for the fingers)
Anguli- shakti-vikasaka (for the fingers)
Vaksa-sthalashakti-vikasaka (for the chest)
Vaksa-sthalashakti-vikasaka (for the chest)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarasakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Kati shakti-vikasaka (for the waist)
Kati shakti-vikasaka (for the waist)
Kati shakti-vikasaka (for the waist)
Kati shakti-vikasaka (for the waist)
Kati shakti-vikasaka (for the waist)
Muladhara-chakra-suddhi (for the rectum)
Upasthatatha-svadhisthana-chakra-suddhi (for the genital organs)
Kundalinishakti-vikasaka (for the kundalini)
Janghashakti-vikasaka (for the thighs)
Janghashakti-vikasaka (for the thighs)
Janushakti-vikasaka (for the knees)
Pindalishakti-vikasaka (for the calves)
Pada-mulashakti-vikasaka
Gulpha-pada-pristha-pada-tala-shakti-vikasaka (for the ankles and the feet)
Padangulishakti-vikasaka (for the toes)

2. YOGSANA (Sitting Postures)

Dandasana, Swastikasana, Padmasana,Vajrasana, Supta Vajrasana, Kagasana, Utkatasana, Gomukhasana,Ushtrasana, Shashankasana, Janusirasana, Paschimottanasana, Bhramacharyasana, Mandukasana, Utthana Mandukasana, Vakrasana, Ardha Matsyendrasana, Marichayasana, Simhasana

3. YOGSANA (Supine lying Postures)

Pavanamuktasan, Utthana-padasana, Ardha Halasana, Halasana, Setubandha Sarvangasana, Sarvangasana, Matsyasana, Chakrasana, Shavasana

4. YOGSANA (Prone lying Postures)

Makarasana, Bhujangasana, Shalabhasana, Dhanurasana, Kapotasana, Raja Kapotasana

5. PRANAYAMA (with Antar & Bahya Kumbhaka)

Surya-bhedi and Chandra-bhedi Pranayama, Ujjayi Pranayama, Sheetali Pranayama, Shitkari Pranayama, Bhastrika Pranayama

6. BANDHA

Jivha Bandha, Jalandhara Bandha, Uddiyana Bandha, Mula Bandha, Maha Bandha, Tri Bandha

7. PRACTICES LEADING TO MEDITATION

Ajapa Dharana, Yog Nidra, Practices leading to Breath Meditation, Practices leading to Om Meditation

8. YOGSANA

Siddhasana, Bhadrasana, Baddha Padmasana, Uttitha Padmasana, Bhunamanasana, Hanumanasana, Bakasana, Kukkutasana, Garbhasana, Matsyendrasana, Marjariasana, Padangusthasana, Hastapadangusthasana, Garudasana, Vatayanasana, Natarajasana, Mayurasana, Padma Mayurasana, Sirshasana and its variations, Ekapada and Dwipada Kandarasana

9. MUDRAS

Yog Mudra, Maha Mudra, Shanmukhi Mudra, Shambhavi Mudra, Kaki Mudra, Tadagi Mudra, Vipareet Karni Mudra, Simha Mudra

Distribution of Marks: Total 100 (10+30+20+40)
1. Class Attendance / Punctuality –   **10 marks**
2. Active Participation in Sports Related Activities -   **30 marks**
3. Viva/Subject Knowledge-   **20 marks**
4. End Semester Practical Exam (Yogic Practice)-   **40 marks**

National Service Scheme (NSS)

Course Title: NCC/NSS/Yoga   Course Code: SWNC102;

LTP: 002   Credit: 1 (Semester 1 to 6)

Overall Objective:

Development of Student's personality through community service.

Aims & Objective of NSS:

i. To understand the community in which they work.

ii. To understand themselves in relation to their community.

iii. To identify the needs and problems of the community and involve them in a problem-solving process.

iv. To develop among themselves a sense of social and civic responsibility.

v. To utilize their knowledge in finding practical solutions to individual and community problems.

vi. To develop the competence required for group living and sharing responsibilities.

vii. To gain skills in mobilizing community participation.

viii. To acquire leadership qualities and a democratic attitude.

ix. To develop capacity to meet emergencies and natural disasters.

Joining NSS:

Simply by enrolling/registering yourself in the NSS unit through the NSS Programme Coordinator/Officer concerned.

Guidelines for Evaluating NSS Students

Curriculum's 1-credit Course (Semester 1 to 6)

For the curriculum's credit award to students under NSS, the following procedure will be adopted:

Students should engage in various NSS activities (listed in Annexure-1) for at least 240 hours in three years (minimum 40 Hrs/semester).

The attendance records of students will be maintained by their unit's respective Programme Officer.

A student who participates in different activities of NSS during the 1st to 6th semester then he/she will earn certain hours per activity depending upon his/her role and responsibilities carried out by the volunteer as per the following rules:

S.No.	Role	No. of Hours
1	Audience	Upto 5 Hours
2	Active Participation	Upto 7 Hours
3	Organizer	Upto 10 Hours

Distribution of Marks: Total 100 (20+20+20+40)

Class Attendance: 20

Discipline & Punctuality: 20

Event Knowledge: 20

Comprehensive Viva (for all activities held during the entire semester): 40

Annexure-1 (Tentative NSS Activities Planned for an Academic Year)

Activities
Vanmohotsava Week (5-7 days) (Environment Enrichment & Tree Plantation) (Nearby places like public institutions, adopted villages/slum areas, and wasteland and other such activities)
Disaster Management (Workshops, awareness camps for Relief and rescue work inoculation and immunization, distribution of medicines, essential goods)
Adopted village (visiting some nearby villages and deciding 2-3 villages to be adopted for literacy promotion and basic facilities like drinking water, pucca/kutchha road, school shed/buildings, cooperative/self-employment scheme, etc.)
Independence Day (Participation in the college celebration)
Literacy Week (Pledge-taking ceremony, Visit to adopted village/slum to organize dialogue and discussion, Putting up hoardings and banners at prominent places in the local area)
Health Service & Awareness (Integrated Child Development Programme, Health Education, HIV/AIDS Awareness Programme, Motivating parents to send children to school and other such activities)
"**Annual NSS Day Celebrations**" of NSS
Digital Transactions Awareness Programs ("Startup India – Stand up India")
Blood Donation Camp in collaboration with NITKAA
Autumn Camp (**4-6 days)** in a nearby village (Youth for Sustainable Development with a focus on Watershed Management & Wasteland Development or some other theme)
Gandhi Jayanti (Quiz competition, Speech, Communal Harmony DAY, and other such activities)
Quami Ekta Week (National Integration Day, Welfare of Minorities Day, Cultural Unity Day, Women's Day, Conservation Day)
Swachhta Pakhwada (various activities like cleanliness campaigns in campus, locality, road safety, and other such activities engaging GOI Ministries/Departments initiatives)
Legal Literacy-Social Justice (Lecture by relevant person and other activities
World AIDS Day (creating awareness among school and college-going students, organizing lectures, public discussions, film shows, rallies and street plays)

Energy Conservation Day (awareness programme and other activities
National Youth Week (Lectures/Symposia on the philosophy and teaching of Swami Vivekanand, Mahatma Gandhi; Debate on the role of youth in the contemporary situation; Essay/drawing competitions amongst youth)
Republic Day (Participation in the college celebration)
Nasha Mukti Abhiyan (Awareness on the part of Tobacco Free Society; campaigns, posters, programmes in Hostels)
Women's Week (Special programmes regarding the significant role of women and girl child; Prominent women leaders lectures; awareness programmes and other such activities)
National Safety Day/ Week (Activities based on a theme provided by National Safety Council (GOI))
Life Skills and Vocational Training Programmes (Industry professional for lectures, competitions and other such activities)
Career Guidance (For college students through prominent speakers; NSS volunteers going to schools to provide guidance to 9-12th students and other such activities)
Environment Enrichment & Climate Change (Special programmes like lectures, campaigns, posters and other such activities)
World Bicycle Day Celebration
Other Activities: Activities suggested by Institute, State NSS Unit, MHRD, GOI Ministries etc.

Guidelines for evaluation of student activities under Students Clubs
(1st to 6th Semester: 02 credit)

The Students Clubs provide facilities and the right environment to develop extra-curricular skills in the students, in addition to the academic knowledge imparted by the Institute. Twelve (12) different clubs are working under Students Clubs which organized various events (workshops, guest lecturers etc.) and competitions, to instil the spirit of healthy competition among students, throughout the year. A national level mega cultural festival under the name CONFLUENCE is organized every year. Students can earn course credit by participating in various events organised by the student's club and assisting in coordinating these events as a member of these clubs.

For the credit award to students under students club, following is recommended:

1. Students must engage in club activities for 240 hours in three years (40 hours in one semester).
2. The evaluation criterion and activity hours will be calculated as follows:

SNo	Evaluation Criterion	Number of hours credited	Distribution of Max Marks 100 (Weightage 80%)
1.	Participation as an Audience	0.5 hour* number of event hours	--
2.	Participation as an Performer	(a) 06 hours for full day activity (b) 03 hours for half day activity	10 05
3.	Prize/Award/Recognition (intra - college events)	05 hours	20
4.	Prize/Award/Recognition (inter - college events)	10 hours	30
5.	Organization of event	(a) 12 hours for full day activity (b) 06 hours for half day activity	20 10
6.	Sponsorship Note: Number of hours will be equally divided among students involved where minimum Rs. 25,000/- per students must be ensured.	(a) 15 hours for sponsorship upto 01 Lakh (b) 30 hours for sponsorship upto 05 Lakh (c) 40 hours for sponsorship more than 05 Lakh	(a) 15 (b) 30 (c) 40 Note: Marks will be divided equally in team members, if any

3. The comprehensive viva-voce (**Weightage 20%**) will be conducted at the end of every semester.
4. Documents required as proof:

a. **Participation**: A certificate of participation duly signed by the organizing club's faculty-in-charge. All clubs will maintain a record of certificates issued for verification.

b. **Prize/Reward/Recognition**: A Certificate of Merit/Letter of Appreciation duly signed by Head of the Institute/Dean (SW)/Professor-in-charge of Students Club.

c. **Organization**: A Certificate of Appreciation mentioning event's name and committee's name in which the student contributed.

d. **Sponsorship**: A letter of sponsorship from sponsoring organization mention amount and list of students involved in sponsorship effort. The amount will be equally divided among the students for award of hours and marks as per criterion 6.

Note:

1. Faculty in charges of the individual clubs must ensure at least 40 hours of activities per semester and must keep the record of number of hours for each and every student involved/ registered for clubs.
2. Further, workload of two (02) hours per week should be included as teaching load for faculty in-charges (FIC) and Professor In-charges (PIC) in order to ensure smooth conduct of activities of the clubs.
3. It is recommended to make provision for earned leave for organising events in non-working days.

Guidelines for evaluation of student activities under Technical Societies
(Semester 1st to 6th: 240 hrs.:   1 credit)

There are 12 societies/clubs currently under technical societies which conduct various events (competitions, workshops, guest lectures, meetings etc.) throughout the year and one major event TECHSPARDHA, the annual technical festival is conducted once a year. Each of this society/club is headed by a team of students usually from final year of their programme under the guidance of a faculty-in-charge.

Under new curriculum for B. Tech students, the activities of all technical societies/clubs are to be considered as an audit course. The credit for this course will be awarded at the end of 6th semester.

Students can earn course credit by participating in various events organised by the technical societies and help in coordinating these events as a member of these societies/clubs. The selected heads of societies/clubs under supervision of faculty-in-charge will ensure that each member is engaged in the activities of society/club for at least 40 hours in each semester (240 hours in 6 semesters) to fulfil the requirement of award of credits

At the end of sixth semester the evaluation of student will be carried by a committee of faculty-in-charges of the technical societies. They will be awarded points on following criterion:

Sr. No.	Criterion	Semester I and II (max 20 marks)	Semester III and IV (max 30 marks)	Semester V and VI (max 50 marks)
1.	Participation	1/event	1.5/event	2/event
2.	Prize/Award/ Recognition (intra-college events)	2/event	3/event	4/event
3.	Prize/Award/ Recognition (inter-college events)	4/event	6/event	8/event
4.	Organization	4/event	6/event	8/event
5.	Sponsorship	4/ (Rs10K worth of sponsorship individually)	6/ (Rs20K worth of sponsorship individually)	8/ (Rs40K worth of sponsorship individually)

The committee will duly verify the credentials of each candidate and award marks on above criterion. Student will be awarded a grade as per institute norms.

Documents required as proof:

   e. Participation: A certificate of participation duly signed by the organizing club's faculty-in-charge. All societies/clubs to maintain a record of certificates issued for verification.
   f. Prize/Reward/Recognition: A Certificate of Merit/Letter of Appreciation duly signed by Head of the Institute/Dean(R&C)/Professor-in-charge of Technical Societies.
   g. Organization: A Certificate of Appreciation mentioning event's name and committee's name in which the student contributed, duly signed by the faculty-in-charge of the organizing club.
   h. Sponsorship: A letter of sponsorship from sponsoring organization mention amount and list of students involved in sponsorship effort. The amount will be equally divided among the students for award of marks as per criterion 5.

Bearing in mind that the activities of clubs/societies are a part of curriculum now, following recommendation may kindly be considered:

   1. Adequate space may be allocated to each society/club for conducting meeting, storing materials and equipment and keeping records.
   2. Adequate staff and office space be provided to professor-in-charge (Technical Societies) keep track of purchases, maintain accounts and records and secretarial assistance.
   3. An engagement of one hour per week in the load of faculty-in-charge be shown in timetable to compensate for time devoted to the activities of club/societies.

B.Tech. (Information Technology)

Course Code	:	ITPC 200
Course Title	:	Operating System
Number of Credits and L/T/P scheme	:	4 &3/ 0/ 2
Prerequisites (Course code)	:	
Course Category	:	PC

Course Learning Objectives

1. To understand the services and design of an operating system.
2. To understand the structure and organization of file system
3. To understand the process states and various concepts such as scheduling and synchronization related with it.
4. To understand different memory management approaches.
5. Students should be able to use system calls for managing processes, memory and file system.
6. students should understand the data structures and algorithms for implementation of OS.

Course Content

Unit-I: Computer system architecture and organization, Introduction and evolution of OS, Introduction to distributed OS, Real time systems and multimedia systems. OS structures: OS services, system calls and programs, OS design and implementation. Processes: Process concept, scheduling policies, algorithms, multilevel queuing, operations on process, Inter-process communication. Threads: multithreading models and threading issues. CPU scheduling: Criteria and algorithms, multiprocessor and thread scheduling.

Unit II: Process synchronization: critical sections, classical two process and n-process solutions, hardware primitives for synchronization, semaphores, monitors, classical problems in synchronization (producer-consumer, readers-writer, dining philosophers, etc.).

Deadlocks: modelling, resource allocation, characterization, prevention and avoidance, detection and recovery.

Unit III: Memory management: Swapping, contiguous memory allocation, paging, multilevel paging, segmentation, demand paging, page replacement algorithms, allocation of frames, thrashing, working set model. Input/Output: I/O system and services, device controllers and device drivers, disks, scheduling algorithms and management.

Unit IV: File system interface: access methods, access control, directory structures, file organization, file sharing and protection. system performance, protection and security, , OS design considerations for security, access control lists and OS support, internet and general network security. Operating system as service provider: Access control matrix, access control list, capability matrix, encryption and access permissions in Linux and Windows.

Reference Books:
1. A. Silberschatz, Peter B. Galvin and G. Gagne, "Operating System Concepts," (9th or newer edition), Wiley.
2. H. Brinch, "Operating System Principles," Prentice Hall of India.
3. Dhamdhere, "Systems programming & Operating systems," TataMcGrawHil
4. A. N. Habermann, "Introduction to Operating System Design," Galgotia publication, New Delhi.
5. A.S. Tanenbaum, "Modern Operating Systems," Prentice Hall of India.

Course outcomes

At the end of the course student will be able to
1. Understand functions, structures and history of operating systems
2. Able to know the design issues associated with operating systems
3. Master various process management concepts such as scheduling, synchronization, multithreading and deadlocks
4. Understand the various concepts associated with memory management such as virtual memory, demand paging, page replacements algorithms
5. Be familiar with various protection and security mechanisms
6. Be familiar with virtualization and operating system components

B.Tech. (Information Technology)

Course Code	:	ITPC 202
Course Title	:	Computer Networks
Number of Credits and L/T/P scheme	:	4 & 3 0 2
Prerequisites (Course code)	:	
Course Category	:	PC

Course Learning Objectives:
1. Understand computer network basic, different models used for study of computer networks, ability to identify different designs, understanding of the issues surrounding wired and wireless Networks.
2. Design, calculate, and apply subnet masks to fulfil networking requirements and building the skills of routing mechanisms.
3. Analyse the features and operations of various application layer protocols such as Http, DNS, SMTP and FTP.
4. Analyse the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Course Content:
1. Introduction
History and development of computer networks, Network Functions, Network Topology, Network Services, Switching Approaches, Transmission media and systems, OSI Reference Model, Overview of TCP/IP architecture,

2. Physical, MAC and Data Link Layer
Different types of transmission media, errors in transmission: attenuation, noise, multiplexing and signalling techniques, Encoding (NRZ, NRZI, Manchester, 4B/5B, etc). Aloha, CSMA, CSMA/CD, CSMA/CA protocols, Ethernet, including Gigabit Ethernet and WiFi (802.11), Token Ring, Bluetooth and Zigbee. Error detection, Sliding Window, Stop and Wait protocols, ARQ, Sliding Window Protocols, HDLC, PPP protocols.

3. Network layer:
Internet Protocol, IPv6, ARP, DHCP, ICMP, Routing algorithms: Distance vector, Link state, Metrics, Inter-domain routing. Subnetting, Classless addressing, Network Address Translation, IPv4 to IPv6 Translation strategies, Packet network topology, Datagrams and Virtual Circuits, Structure of Switch/Router, Connectionless and Virtual Circuit packet Switching, Traffic management and QoS – FIFO, Priority Queues, Fair Queuing, MPLS.

4. Transport and Application layer:
UDP, TCP. Connection establishment and termination, sliding window revisited, flow and congestion control, timers, retransmission, TCP extensions, etc. Client Server Model, HTTP, DNS, SMTP, FTP, and TFTP.

Text Books:
 1. Behrouz A. Forouzan: Data Communications and Networks, Fifth Edition, McGraw Hill, 2017.
 2. Leon Garcia and IndraWidjaja: Communication Networks – Fundamental Concepts and Key Architectures, Second Edition TMH.
 3. A.S. Tanenbaum: Computer Networks, Sixth Edition, Pearson Education, 2022.
 4. William Stallings: Data and Computer Communications 10/e, Pearson Education.

Course Outcomes:
At the end of the course student will be able to……
 1. Understand computer network basic, different models used for study of computer networks, ability to identify different designs, understanding of the issues surrounding wired and wireless Networks.
 2. Design, calculate, and apply subnet masks to fulfil networking requirements and building the skills of routing mechanisms.
 3. Analyse the features and operations of various application layer protocols such as Http, DNS, SMTP and FTP.
 4. Analyse the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
 5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

B.Tech. (Information Technology)

Course Code	:	ITPC 204
Course Title	:	Artificial Intelligence and Soft Computing
Number of Credits and L/T/P scheme	:	4 & 3/0/2
Prerequisites	:	Design and analysis of algorithm
Course Category	:	PC

Course Learning Objectives
1. Introduction and awareness of problem-solving strategies of artificial intelligence.
2. Understanding of evolutionary computation concepts.
3. Inception of biologically inspired algorithm concepts.
4. Overview of fuzzy systems.

Course Content
1. Introduction: Introduction of Soft Computing, Soft Computing vs. Hard Computing, Various Types of Soft Computing Techniques, Applications of Soft Computing.
2. AI Problem Solving: Uninformed Search Strategies, Informed Search Strategies, Local Search Strategies, Adversarial Search, Search for Constraint Satisfaction Problems.
3. Knowledge and Reasoning: Logical Agents, First-Order Logic Inference in First-Order Logic, Knowledge Representation, Automated Planning.
4. Nature Inspired Algorithms: Genetic Algorithms, Genetic Programming, Evolutionary Programming, Swarm Intelligence: Ant Colony Optimization, Artificial Bee colony, Particle Swarm Optimization.
5. Fuzzy Logic: Fuzzy Sets, Fuzzy rules, Fuzzy Reasoning, Fuzzification and Defuzzification Methods, Fuzzy inference system.

Text Books:
1. Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach, Prentice Hall, Fourth Edition, 2022.
2. Zbigniew Michalewicz, Genetic Algorithm+ Data Structures = Evolutionary Programs, Springer, Third Edition.
3. James Kennedy, Russell C. Eberhart and Yuhui Shi, Swarm Intelligence, Morgan Kaufmann, First Edition.
4. Jang J.S.R., Sun C.T. and Mizutani E , Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, Pearson Education India, First Edition.

Reference Books:
1. D.E. Goldberg, Genetic Algorithms: Search, Optimization and Machine Learning, Addison Wesley, N.Y.
2. Marco Dorigo and Thomas Stützle, Ant Colony Optimization, The MIT Press, First Edition.
3. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill, Third Edition.

Course outcomes
1. Design proficiency of various artificial intelligence problem solving strategies.
2. Comprehensive understanding of evolutionary computation.
3. Extensive exposure of nature inspired computational concepts.
4. Knowledge of fuzzy applications.

Course Code	:	ITPE 210
Course Title	:	Software Development using UML and Agile Methodology
Number of Credits and L/T/P scheme	:	4 & 3/0/2
Prerequisites (Course code)	:	Software Engineering
Course Category	:	PE

Course Learning Objectives
The objective of this course is to prepare students for software development using UML and agile methodology.

Course Content
Unit-1: Unified Modelling Language (UML) Fundamentals
Introduction, An Overview of UML, Modelling Concepts - Systems, Models, and Views, Data Types, Abstract Data Types, and Instances, Classes, Abstract Classes, and Objects, Event Classes, Events, and Messages, Object-Oriented Modelling, Falsification and Prototyping.
A Deeper View into UML: Use Case Diagrams, Object diagram, Class Diagrams, Sequence diagram, Collaboration diagram, Interaction overview diagram, State machine diagram, Activity diagram, Component diagram, Deployment diagram, Package diagram, Timing diagram.

Unit-2: Agile Fundamentals
What is Agile? Why Agile? Why not Agile? Scrum, overview of PMI-ACP certification, The Agile Manifesto, twelve principles behind the Agile Manifesto.
Agile Concepts: Scrum, Extreme Programming, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools, Burndown chart

Unit-3: Managing Project with Scrum
The Rules of Scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum Events, Scrum Roles, Scrum Artifacts, Product backlog, SprintBacklog, User story: definition, characteristics and content, Sprint planning.

Unit-4: Agile Software Development in Practice
Lean Software Development, Kanban, Jira, Asana, Trello, Slack, Version Control. Using Patterns: What is a pattern and what makes a pattern? Properties of Patterns, Pattern – A Three-part Schema,Layer Pattern, Broker Pattern, Pipe and Filter Pattern, Model-View-Controller Pattern.

Text Books:
1. Bernd Bruegge & Allen H. Dutoit, "Object-Oriented Software Engineering Using UML, Patterns, and Java" Third Edition, Pearson
2. Andrew Stellman,& and Jennifer Greene., "Head First Agile: A Brain-Friendly Guide to Agile Principles, Ideas, and Real-World Practices. " O'Reilly Media, Inc.", 2017.
3. Len Bass, Paul Clements, Rick Kazman, Software Architecture in Practice, Pearson Education, Third edition, 2013.
4. BernhardRumpe, "Agile modeling with UML: code generation, Testing, Refactoring", Cham: Springer, 2017.

Reference Books:
1. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson, 2001.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, Unified Modeling Language User Guide, Addison Wesley, 2nd Edition, 2012.
3. Robert C. Martin, Agile Software Development- Principles, Patterns and Practices, Prentice Hall, 2013.

Course outcomes

At the end of the course student will be able to:
1. Understand the concepts of Unified Modeling Language (UML) and UML diagrams during object oriented analysis and design.
2. Software development and process control using agile and scrum methodology.
3. Use tools and techniques such as Kanban, Jira, Asana, Trello, Slack for Agile Software Development.
4. Justify designs based on design principles, patterns, and heuristics.

B.Tech. (Information Technology)

Course Code	:	ITPE 212
Course Title	:	Competitive Programming and Efficient Coding For Problem Solving
Number of Credits and L/T/P scheme	:	4 and 3/0 /2
Prerequisites(Course code)	:	Data Structures Design and Analysis of Algorithms
Course Category	:	PE

Course Learning Objectives:
1. Identifying multiple alternate coding solutions of problems discussed in programming tests and Competitive Problems (CP) and developing understanding of their efficiency issues.
2. Designing and developing brute-force solutions followed by time/space efficient solutions for CP problems.
3. Learning commonly used problem solving approaches and applying them for coding the solutions for new problems.

Course Content:
1. Overview of Efficient Coding for Problem Solving and CP: Introduction to competitive programming (CP); revisit of complexity analysis; introduction to online platforms such as codechef, codeforces etc and online submission; constraints during CP, online testing process and common errors such as TLE; use of STL
2. Use of Number Theory for problem-solving: reducing time/space complexity of brute force coding solution of Sieve Method, Inverse Module, Euclidian Method of factorization; efficient coding for Permutation Combination; XORing based and pattern based solutions,
3. Coding for Optimizing time and Space using Sequential Storage: two pointer approach; problem-solving using arrays and strings such as rotation on sorted arrays, duplicate removal, string matching algorithms; Kadane's algo, stacks, priority-queues and hashing based efficient coding; median based problems and alternate solutions.
4. Applying Non-Linear Data Structures for real-life problems: design of efficient solutions for problems such as finding loops in a linked list, memory efficient DLL, block reversal in LL; problem solving using trees and binary trees, Catalan numbers, applications of graphs, spanning tree and path algos for CP problems with reduced time/space complexity
5. CP Problem Solving using Advanced Topics: concept of disjoint sets and their efficient representation, algorithmic approaches such as Greedy, Backtracking, Dynamic Programming and applying them for CP problems using bottom-up dynamic programming.

Text Books:
1. Karumanchi: Data Structures and Algorithms Made Easy, CareerMonk Publications, 2017
2. G L McDowell: Cracking the Coding Interviews, CareerCup Publications, 2016
3. geekforgeeks.org
4. codechef.com, spoj.com, codeforces.com, interviewbit.com

Course Outcomes:
1. Understanding the issues of online platforms and Competitive Programming (CP) and developing brute force coding for commonly asked CP problems.
2. Analyzing the space and time complexity of brute force solutions and designing efficient solutions.
3. Evaluating the applicability of suitable algorithmic approaches to solve relevant CP problems. Creating efficient solutions of CP problems using the learnt algorithmic approaches.

B.Tech. (Information Technology)

Course Code	:	ITPE 214
Course Title	:	Scripting Languages
Number of Credits and L/T/P scheme	:	4 and 3/0/2
Prerequisites (Course code)	:	
Course Category	:	PE

Course Learning Objectives:
(The relevant objectives of the course are to be listed)
1. Understanding the Basics of scripting history of scripting and use of scripting languages to webpages.
2. Understand the use of HTML5 Elements and differentiate with HTML for authoring web pages.
3. Able to apply Cascading style sheet for applying stylistic information to web pages.
4. Able to apply JavaScript logic on webpage for creating interactive web pages.
5. Understands and applies PHP and the basis of database connectivity.

Course Content:
(Course content should be uniformly divided into 4 or 5 sections/units with the last unit also incorporating topics around sustainable technologies/models/methods/techniques pertaining to that course)

1. **Introduction**
Introduction to Scripting Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Shell Scripts, Web Scripting, and the universe of Scripting Languages

2. **HTML**: HTML, HTML5, and XHTML basics, Elements, Attributes and Tags, Basic and Advanced Tags, Frames, Images, Relative URLs, Forms, Creating HTML Documents.

3. **Style Sheet:** CSS-Introduction to Cascading Style Sheets, Features, Core Syntax, Style Sheets and HTML Box Model.

4. **JAVA SCRIPT&AJAX:**
JavaScript: Introduction, Variables, Literals, Operators, Control structure, Conditional statements, Arrays, Functions, Objects, Predefined objects, Object hierarchy, Accessing objects, Reactive web pages elements: Events, Event handlers, multiple windows and Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms
AJAX Introduction, XML Http Request Object, Call back Methods, DHTML with JavaScript.

5. **PHP** Essential PHP - Operators and Flow control - Strings and Arrays - Creating functions - Reading data in web pages - PHP Browser Handling Power - File Handling -Session Handling in PHP – Cookies – Connection with MySQL.

Text Books:
1. Jeffrey C. Jackson, "Web Technologies - A Computer Science Perspective", Pearson Education.
2. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, Third Edition.
3. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
4. The World of Scripting Languages, David Barron, Wiley Publications.
5. Web Programming, building internet applications, Chris Bates 2nd Edition, WILEY.
6. Beginning JavaScript with Dom scripting and AJAX, Russ Ferguson, Christian Heilmann, Apress.

Course Outcomes:

At the end of the course student will be able to……
1. Understanding the Basics of scripting history of scripting and use of scripting languages to webpages.
2. Able to use HTML5 Elements and differentiate with HTML.
3. Able to apply style sheet and JavaScript logic on webpage.
4. Build a dynamic web page using JavaScript & Ajax.
5. Able to write a script for webpage using PHP.

B.Tech. (Information Technology)

Course Code	:	ITPC 206
Course Title	:	Database Management Systems
Number of Credits and L/T/P scheme	:	4 & 3/0/2
Prerequisites	:	
Course Category	:	PC

Course Learning Objectives:
1. To understand data models and database systems.
2. To understand relational database theory,
3. To learn database design and its normalization.
4. To understand concepts of transaction, its processing, and management.
5. To learn concurrency control techniques.
6. To develop practical skill in using MySQL DBMS.

Course Content:

Unit-1 (Introduction)
Data, Database, Database management system, Historical background from file systems to Database Systems, Data Models, Relational Data Model, ER model, Schemas and Instances, Database users, DBMS architecture.

Unit-2 (Relational Model and Query Language)
Theory of Relational Database, Key Integrity constraint, Relational Algebra, Relational Calculus: Domain Relational Calculus, Tuple Relational Calculus, SQL, queries writing in SQL.

Unit-3 (Database Design)
Normalization, Database Anomalies, Functional Dependencies, Candidate and Super Key, Non-loss Decomposition, Dependency Preservation, First, Second, Third Normal, BCNF, etc.

Unit-4 (Transaction Processing)
Transaction concept, a simple transaction model, states, ACID Properties, implementation of ACID properties, Serializability.

Unit-5 (Concurrency Control)
Need for Concurrency, Lock-based protocols, Deadlock, Starvation, deadlock handling, time-stamp based protocols, validation-based protocols.

Text Books:
1. A Silberschatz, H.F. Korth & S. Sudarshan: Data Base System Concepts, Mc Graw Hill, 4th, 5th or 6th edition.
2. Elmasri &Navathe : Fundamentals of Database Systems, 5th, 6th, or 7th edition Pearson.

Course Outcomes
1. To Design and Implement a small database for applications using MySQL DBMS.
2. To apply the concepts of normalization to database design.