NEW HORIZON
COLLEGE OF ENGINEERING

Department of Information Science and Engineering

Academic Year 2024-25

7th and 8th Semester

Scheme & Syllabus

BATCH: 2021-25

CREDITS:160

NEW HORIZON COLLEGE OF ENGINEERING

VISION

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

MISSION

• To strengthen the theoretical, practical and ethical dimensions of the learning process by fostering a culture of research and innovation among faculty members and students.

• To encourage long-term interaction between academia and industry through their involvement in the design of the curriculum and its hands-on implementation.

• To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities.

QUALITY POLICY

To provide educational services of the highest quality both curricular and co-curricular to enable students integrate skills and serve the industry and society equally well at global level.

VALUES

- ➢ Academic Freedom
- ➢ Integrity
- ➢ Inclusiveness
- ➢ Innovation
- ➢ Professionalism
- ➢ Social Responsibility

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

VISION

To emerge as a Department of Eminence in Information Science and Engineering in serving the Information Technology industry and the nation by empowering students with a high degree of technical and practical competence.

MISSION

• To strengthen the theoretical, practical and ethical dimensions of the learning process by continuous learning and establishing a culture of research and innovation among faculty members and students, in the field of information science and engineering.

• To build long-term interaction between the academia and Information Technology industry, through their involvement in the design of curriculum and its hands-on implementation.

• To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities.

Program Education objectives (PEOs)

PEO 1	Excel as Information Science Engineers with the ability to solve a wide range of computational problems in the IT industry, Government or other work environments.
PEO 2	Pursue higher studies with profound knowledge enriched with academia and industrial skill sets.
PEO 3	Exhibit adaptive skills to develop computing systems using modern tools and technologies in multidisciplinary areas to meet technical and managerial challenges, which meet societal requirements.
PEO 4	Possess the ability to collaborate as a team member and leader with professional ethics to make a positive impact on society.

PEO to Mission Statement Mapping

PEO Statements	M1	M2	M3
PEO 1: Excel as an Information Science Engineer with the ability to solve a wide range of computational problems in the IT industry, Government or other work environments.	3	3	2
PEO 2: Pursue higher studies with profound knowledge enriched with academia and industrial skill sets.	3	3	2
PEO 3: Exhibit adaptive skills to develop computing systems using modern tools and technologies in multidisciplinary areas to meet technical and managerial challenges which meet societal requirements.	3	3	3
PEO 4: Possess the ability to collaborate as a team member and leader with professional ethics to make a positive impact on society.	2	2	3

Correlation: 3- High, 2-Medium, 1-Low

Program Specific Outcomes (PSO's)

PSO1: The ability to understand, analyze and develop computer programs in the areas of Information Science and Engineering related to System Software, Web Design, Big Data Analytics, Machine Learning, Internet of Things, Data Science, Networking and Security for efficient design of computer-based systems of varying complexity.

PSO2: The ability to apply standard practices and strategies in software project development using innovative ideas and open-ended programming environment with skills in teams and professional ethics to deliver a quality, sustainable product for business success in the field of Information Science.

Program Outcomes (PO) with Graduate Attributes

	Graduate Attributes	Program Outcomes (POs)
1.	Engineering Knowledge	**PO1:** The basic knowledge of Mathematics, Science and Engineering.
2.	Problem analysis	**PO2:** An Ability to analyze, formulate and solve engineering problems.

3.	Design and Development of Solutions	**PO3:** An Ability to design system, component or product and develop interfaces among subsystems of computing.
4.	Investigation of Problem	**PO4:** An Ability to identify, formulate and analyze complex engineering problem and research literature through core subjects of Computer Science.
5.	Modern Tool usage	**PO5:** An Ability to use modern engineering tools and equipments for computing practice.
6.	Engineer and society	**PO6:** An Ability to assess societal, health, cultural, safety and legal issues in context of professional practice in Computer Science & Engineering.
7.	Environment and sustainability	**PO7:** The broad education to understand the impact of engineering solution in a global, economic, environmental and societal context.
8.	Ethics	**PO8:** An understanding of professional and ethical responsibility.
9.	Individual & team work	**PO9:** An Ability to work both as individual and team player in achieving a common goal.
10.	Communication	**PO10:** To communicate effectively both in written and oral formats with wide range of audiences.
11.	Lifelong learning	**PO11:** Knowledge of contemporary issues, Management and Finance.
12.	Project management and Finance	**PO12:** An Ability to recognize the need and thereby to engage in independent and life-long learning for continued professional and career advancement.

Mapping of POs with PEOs

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
PEO 1	3	3	3	2	3	-	-	-	3	-	3	-
PEO 2	3	3	3	2	3	-	-	-	3	-	3	-
PEO 3	3	3	3	2	3	-	-	-	3	-	3	-
PEO 4	3	3	3	2	3	-	-	-	3	-	3	-

Correlation: 3- High, 2-Medium, 1-Low

NEW HORIZON COLLEGE OF ENGINEERING

B. E. in Information Science and Engineering

Scheme of Teaching and Examinations for 2021- 2025 BATCH (2021 Scheme)

VII Semester

S. No.	Course and Course Code		Course Title	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
					L	T	P	S			CIE	SEE	Total
1	PCC	21ISE71	Mobile Application Development	IS	3	0	0	0	3	3	50	50	**100**
2	PCC	21ISE72	Software Testing & Automation	IS	3	0	0	0	3	3	50	50	**100**
3	PROJ	21ISE73	Project Work	IS	0	0	12	0	12	0	100	100	**200**
4	AEC	21ISK74	Scientific Foundations of Health	IS	1	0	0	0	1	1	50	50	**100**
5	OEC	23NHOP7XX	Industrial Open Elective Course-II	Offering Dept.	3	0	0	0	3	3	50	50	**100**
				Total					**22**	**10**	**300**	**300**	**600**

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **PEC**: Professional Elective Course, **OEC**: Open Elective Course, **PROJ**: Project work**, L:** Lecture, **T**: Tutorial, **P**: Practical **S: SDA**: Self Study for Skill Development, C**IE**: Continuous Internal Evaluation, **SEE**:Semester End Evaluation.

NCMC	**21NSS84**	National Service Scheme (NSS)	NSS coordinator	All students have to register for any one of the courses namely National Service Scheme, Physical Education (PE) (Sports and Athletics) and Yoga with the concerned coordinator of the course during the first week of V semester. The activities shall be carried out from (for 4 semesters) between V semester to VIII semester. SEE in the above courses shall be conducted during VIII semester examinations and the accumulated CIE marks shall be added to the SEE marks. Successful completion of the registered course is mandatory for the award of the degree. The events shall to be reflected in the calendar prepared for the NSS, PE and Yoga activities.
	21PES84	Physical Education (PE) (Sports and Athletics)	Physical Education Director	
	21YOG84	Yoga	Yoga Teacher	

Industrial Open Elective Course (OEC): Credit for OEC is 03 (L: T: P: S) can be considered as (3: 0: 0: 0). The teaching and learning of these Courses will be based on hands-on. The Course Assessment will be based on CIE and SEE in practical mode. This Courses will be offered by Centre of Excellence to students of all the branches. Registration to Industrial open electives shall be documented and monitored on college level.

Project Work:

The objective of the Project work is

(i) To encourage independent learning and the innovative attitude of the students.

(ii) To develop interactive attitude, communication skills, organization, time management, and presentation skills.

(iii) To impart flexibility and adaptability.

(iv) To inspire team working.

(v) To expand intellectual capacity, credibility, judgment and intuition.

(vi) To adhere to punctuality, setting and meeting deadlines.

(vii) To install responsibilities to oneself and others.

(viii) To train students to present the topic of project work in a seminar without any fear, face the audience confidently, enhance communication skills, involve in group discussion to present and exchange ideas.

CIE procedure for Project Work:

(1) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide.

The CIE marks awarded for the project work, shall be based on the evaluation of the project work Report, project presentation skill, and question and answer session in the percentage ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

(2) Interdisciplinary: Continuous Internal Evaluation shall be group-wise at the college level with the participation of all guides of the college. Participation of external guide/s,

if any, is desirable. The CIE marks awarded for the project work, shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the percentage ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

SEE procedure for Project Work: SEE for project work will be conducted by the two examiners appointed by the University. The SEE marks awarded for the project work shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the percentage ratio of 50:25:25.

Credit Definition: 1-hour Lecture (L) per week=1Credit 2-hoursTutorial(T) per week=1Credit 2-hours Practical / Drawing (P) per week=1Credit 2-hous Self Study for Skill Development (SDA) per week = 1 Credit	03-Credits courses are to be designed for 40 hours in Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 15 hours of Teaching-Learning Sessions

NEW HORIZON COLLEGE OF ENGINEERING

B. E. in Information Science and Engineering

Scheme of Teaching and Examinations for 2021- 2025 BATCH (2021 Scheme)

VIII Semester

S. No.	Course and Course Code		Course Title	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
					L	T	P	S			CIE	SEE	Total
1	PEC	21ISE81X	Professional Elective Course-III	IS	3	0	0	0	3	3	50	50	**100**
2	SEM	21ISE82	Technical Seminar	IS	0	0	1	0	1	0	50	-	**50**
3	INT	21ISE83	Research Internship/ Industry Internship /Rural Internship	IS	0	0	12	0	12	0	100	100	**200**
4	NCMC	21NSS84	National Service Scheme (NSS)	NSS coordinator	0	0	0	0	0	0	50	50	**100**
		21PES84	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		21YOG84	Yoga	Yoga Teacher									
								Total	**16**	**3**	**250**	**200**	**450**

NCMC: Non-Credit Mandatory Course, **AEC**: Ability Enhancement Course, **SEM**: Seminar, **INT**: Industry Internship / Research Internship / Rural Internship, **L:** Lecture, **T**: Tutorial, **P**: Practical **S: SDA**: Self Study for Skill Development, , **CIE**: Continuous Internal Evaluation, **SEE**:Semester End Evaluation.

Professional Elective Course-III			
21ISE811	Software Architecture and Design Patterns	21ISE814	Quantum Computing
21ISE812	Management and Entrepreneurship	21ISE815	Prompt Engineering
21ISE813	Virtual Reality & Augmented Reality		

Elucidation:

Research/Industry Internship/ Rural Internship / Innovation - Incubation Center Internship / Start-up Internship shall be carried out at an Industry, NGO, MSME, Innovation center, Incubation center, Start-up, center of Excellence (CoE), Study Centre established in the parent institute and /or at reputed research organizations/institutes.

The mandatory Research internship /Industry internship / Rural Internship is for **24 weeks**. The internship shall be considered as a head of passing and shall be considered for the award of a degree. Those, who do not take up/complete the internship shall be declared to fail and shall have to complete it during the subsequent SEE examination after satisfying the internship requirements.

Research internship: A research internship is intended to offer the flavor of current research going on in the research field. It helps students get familiarized with the field and imparts the skill required for carrying out research.

Industry internship: Is an extended period of work experience undertaken by students to supplement their degree for professional development. It also helps them learn to overcome unexpected obstacles and successfully navigate organizations, perspectives, and cultures. Dealing with contingencies helps students recognize, appreciate, and adapt to organizational realities by tempering their knowledge with practical constraints.

The faculty coordinator or mentor has to monitor the student's internship progress and interact with them to guide for the successful completion of the internship.

The students are permitted to carry out the internship anywhere in India or abroad. University shall not bear any expenses incurred in respect of the internship.

With the consent of the internal guide and Principal of the Institution, students shall be allowed to carry out the internship at their hometown (**within or outside the state or abroad**), provided favorable facilities are available for the internship and the student remains regularly in contact with the internal guide.

Non – credit mandatory courses (NCMC):

National Service Scheme/ Physical Education (Sport and Athletics)/ Yoga:

(1)Securing 40 % or more in CIE,35 % or more marks in SEE and 40 % or more in the sum total of CIE + SEE leads to successful completion of the registered course.

(2)In case, students fail to secure 35 % marks in SEE, they has to appear for SEE during the subsequent examinations conducted by the University.

(3)In case, any student fails to register for NSS, PE or Yoga / fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have not completed the

requirements of the course. In such a case, the student has to fulfill the course requirements during subsequently to earn the qualifying CIE marks subject to the maximum programme period.
(4) Successful completion of the course shall be indicated as satisfactory in the grade card. Non-completion of the course shall be indicated as Unsatisfactory.
(5)These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

TECHNICAL SEMINAR (21ISE82): The objective of the seminar is to inculcate self-learning, present the seminar topic confidently, enhance communication skill, involve in group discussion for exchange of ideas. Each student, under the guidance of a Faculty, shall choose, preferably, a recent topic of his/her interest relevant to the programme of specialization.

(i) Carry out literature survey, systematically organize the content.
(ii) Prepare the report with own sentences, avoiding a cut and paste act.
(iii) Type the matter to acquaint with the use of Micro-soft equation and drawing tools or any such facilities.
(iv) Present the seminar topic through PowerPoint slides.
(v) Answer the queries and involve in debate/discussion.
(vi) Submit a typed report with a list of references.

The participants shall take part in the discussion to foster a friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Evaluation Procedure:

The CIE marks for the seminar shall be awarded (based on the relevance of the topic, presentation skill, participation in the question-and-answer session, and quality of report) by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three teachers from the department with the senior-most acting as the Chairman.

Marks distribution for CIE of the course:

Seminar Report: 25 marks
Presentation skill: 10 marks
Technical Paper Publication: 15 marks.

SEVENTH SEMESTER

MOBILE APPLICATION DEVELOPMENT

Course Code	**21ISE71**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

At the end of the course, the student will be able to:

21ISE71.1	Understand the components and structure of android OS and android applications.
21ISE71.2	Understand how to work with various mobile application development frameworks.
21ISE71.3	Apply the basic and important design concepts and issues of development of mobile applications.
21ISE71.4	Analyze the capabilities and limitations of mobile devices.
21ISE71.5	Develop the skills in designing and building mobile applications using android platform.
21ISE71.6	Develop mobile applications using multimedia graphics and animations.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21ISE71.1	3	3	3	2	3	-	-	-	1	-	3	3	3	3
21ISE71.2	3	3	3	2	3	-	-	-	1	-	3	3	3	3
21ISE71.3	3	3	3	2	3	-	-	-	1	-	3	3	3	3
21ISE71.4	3	3	3	2	3	-	-	-	1	-	3	3	3	3
21ISE71.5	3	3	3	2	3	-	-	-	1	-	3	3	3	3
21ISE71.6	3	3	3	2	3	-	-	-	1	-	3	3	3	3

MODULE 1	**INTRODUCTION OF ANDROID OPERATING SYSTEM**	**21ISE71.1**	**8 Hours**

Android OS design and Features – Android development framework, SDK features, Creating AVDs, Types of Android applications, Android tools, Android Application components – Android Manifest file, Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

Text Book	Text Book 1: CH 1.2.2.1, 1.2.2.2, Text Book 2: CH 5.1. 5.2

MODULE-2	**ANDROID UI ARCHITECTURE & UI WIDGETS**	**21ISE71.2**	**8 Hours**

Fundamental Android UI design Layouts, Drawable resources, UIwidgets, Notification, Toasts, Menu, Dialogs, Building dynamic UI with fragments.

Text Book	Text Book 1: CH 1.2.1.2, 1.2.1.3, 1.2.1.4, Text Book 2: CH 6.1, 6.2

MODULE-3	**INTENTS AND BROADCASTS**	**21ISE71.3 21ISE71.4**	**8 Hours**

Intent, Native Actions, using Intent to dial a number or to send SMS. Broadcast Receivers - Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity. Notifications – Creating and Displaying notifications, Displaying Toasts

Text Book	Text Book 1: CH 1.4.1.3, 1.4.2.1, Text Book 2: Ch 7.1,7.2

MODULE-4	DATA STORAGE, SERVICES & CONTENT PROVIDERS:	21ISE71.5	8 Hours
Saving Data, Interacting with other Apps, Apps with content sharing, Shared Preferences, Preferences activity, Files access, SQLite database, Overview of services in Android, Implementing a Service, Service lifecycle, Inter Process Communication.			
Text Book	Text Book 1: CH 1.5.1.1, 1.5.2.1,1.5.3.3, Text Book 2: Chapter 5, Chapter 6, Chapter 7		
MODULE-5	ADVANCED APPLICATIONS	21ISE71.6	8 Hours
Building apps with Multimedia, Building apps with Graphics & Animations, Building apps with Sensors, Bluetooth, Camera, Telephony Services, Building apps with Location Based Services and Google maps.			
Text Book	Text Book 2: Chapter 8, Chapter 11, Chapter 12, Chapter 13		

CIE Assessment Pattern(50 Marks – Theory) –

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment	MCQ's
		25	15	10
L1	Remember	5	-	-
L2	Understand	10	-	-
L3	Apply	5	-	-
L4	Analyze	5	-	5
L5	Evaluate	-	-	5
L6	Create	-	15	-

SEE Assessment Pattern(50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	20
L3	Apply	10
L4	Analyze	10
L5	Evaluate	-
L6	Create	-

Suggested Learning Resources:

Text Books:

1. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/ android developer fundamentals course-concepts/details (Download pdf file from the above link).
2. Reto Meier; Professional Android 2 Application Development; Wiley India Pvt. ltd; 1stEdition;2012; ISBN-13:9788126525898.

Reference Books:

1. Mark Murphy; Beginning Android3; A press Springer India Pvt Ltd.; 1st Edition; 2011; ISBN- 13: 978-1-4302-3297-1

2. Eric Hellman; Android Programming– Pushing the limits by Hellman; Wiley; 2013; ISBN 13:978 1118717370
3. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

Web links and Video Lectures (e-Resources):

- https://developer.android.com
- https://www.geeksforgeeks.org/introduction-to-android-development/

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- NPTEL course
- Project Based Learning – Hands on demonstration in class room with small prototypes
- Case based learning – Student teams formation to solve various use cases using learnt concepts and demonstration in class.
- Contents related activities (Activity-based discussions)

For active participation of students, instruct the students to develop a mobile app by using anu of the technologies read in module-5 and submit a report about the performance of the app with screen shots of the output.

SOFTWARE TESTING AND AUTOMATION

Course Code	**21ISE72**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

At the end of the course, the student will be able to:

21ISE72.1	Explain the fundamental concepts in software testing.
21ISE72.2	Analyse the types of structural testing techniques.
21ISE72.3	Analyze the importance of GUI Testing and software metrics in Software Testing.
21ISE72.4	Describe the Defect Management Process.
21ISE72.5	Understand the Automation process and related tools.
21ISE72.6	Analyze the Testing Tools related to web automation and mobile automation.

Mapping of Course Outcomes to Program Outcomes and Program-Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21ISE72.1	3	3	3	3	3	-	-	-	-	-	1	3	3	3
21ISE72.2	3	3	3	3	3	-	-	-	-	-	1	3	3	3
21ISE72.3	3	3	3	3	3	-	-	-	-	-	1	3	3	3
21ISE72.4	3	1	3	3	3	-	-	-	-	-	1	3	3	3
21ISE72.5	3	1	3	3	3	-	-	-	-	-	1	3	3	3
21ISE72.6	3	3	3	3	3	-	-	-	-	-	1	3	3	3

MODULE-1	**INTRODUCTION TO SOFTWARE TESTING**	**21ISE72.1**	**8 Hours**

Fundamentals: Verification and Validation Techniques – V-Model of Testing – Software Testing - Purpose of Testing - Taxonomy of Bugs - Defect And Failure Analysis – Types of Testing Techniques – Black Box – White Box – Gray Box Testing TestAdequacy and Coverage. Functional Testing Functional testing - Boundary Value Testing - Equivalence class testing - Decision table-based testing -

Self-study / Case Study / Applications	Investigate the working for a triangle program using C language with the test cases and discuss the result		
Text Book	Text Book 1: Ch1, 2, 3,4, 5,6		
MODULE-2	**STRUCTURAL TESTING**	**21ISE72.2**	**8 Hours**
Structural Testing: Path testing - Data and Control Flow Testing – Graph Based Testing - Evaluation of the testing and summary Regression Testing: Need for Regression Testing–Impact Analysis – Regression Test Selection Techniques – Code and Model Based Techniques – Test Case Optimization Techniques.			
Self-study / Case Study / Applications	Investigate ATM system and its specifications based on control flow testing.		
Text Book	Text Book 1: Ch 5, 6,		
MODULE-3	**NON-FUNCTIONAL TESTING GUI TESTING**	**21ISE72.3 21ISE72.4**	**8 Hours**
Nonfunctional testing GUI Testing – Domain Based Testing –Performance Testing – Stress Testing – Load Testing – Acceptance Testing – Alpha, Beta, Gamma Testing – SoftwareAcceptance Plan. Metrics: Importance of Metrics in Testing - Effectiveness of Testing – Defect Density – Defect Leakage Ratio – Residual Defect Density– Test Team Efficiency – Test Case Efficiency–Various Test Reports.			
Self-study / Case Study / Applications	Write a case study on any bug tracking tool.		
Text Book	Text Book 1:Ch 5, 6, 7, 8		
MODULE-4	**AUTOMATION TESTING**	**21ISE72.5**	**8 Hours**
Automation testing: Basics, Significance, Testing using automated tools, Components, Process of Test Automation, Strategies, Automated tests, Examples of test automation, Test Automation maintenance, Automation test frameworks-types, tools.			
Self-study / Case Study / Applications	Write a case study on any web testing tool.		
Text Book	Text Book 1: Ch 7, 8, 9, 11		
MODULE-5	**WEB AUTOMATION**	**21ISE72.6**	**8 Hours**
Web Automation: Client- Server testing, Selenium Automation Framework, Selenium IDE, Selenium Web Driver, Data driven, Keyword driven, Hybrid. Selenium basics, waits, Web Componentconcept, Junit4 basics, Selenium in Java, Page Object Concept, Data transfer Object Concept. Database Testing using Selenium, Cross Browser Testing. Mobile Automation: Mobile application framework, APPIUM basics.			
Self-study / Case Study / Applications	Write a case study on any open source testing tool example test link.		
Text Book	Text Book 1: Ch 10, 11, 12, 13, 14		

CIE Assessment Pattern(50 Marks – Theory) –

RBT Levels		Marks Distribution	
		Test (s)	NPTEL
		25	25
L1	Remember	5	-
L2	Understand	5	-
L3	Apply	5	10
L4	Analyze	5	5
L5	Evaluate	5	-
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	-

Suggested Learning Resources:

Text Books:

1. Matthew Heusser, Michael Larsen, "Software Testing Strategies", 2023
2. Dorothy Graham, Rex Black, "Foundations of Software Testing: ISTQB Certification, 2020
3. M G Limaye, "Software Testing – Principles, Techniques and Tools", Tata McGraw Hill,2009.

Reference Books:

1. Edward Kit, "Software Testing in the Real World - Improving the Process", Pearson Education, 2004.
2. William E. Perry, "Effective methods for software testing", 2nd edition, John Wiley, 2000.

Web links and Video Lectures (e-Resources):

1. "Automation Testing Tutorial", https://artoftesting.com/automation-testing
2. Tools QA, Selenium Tutorial, https://www.toolsqa.com/selenium-tutorial/
3. "Appium Tutorials", https://appium.io/tutorial.html

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Case Study on software tool usage
- NPTEL

PROJECT WORK

Course Code	**21ISE73**	**CIE Marks**	**100**
L:T:P:S	**0:0:12:0**	**SEE Marks**	**100**
Hrs / Week	**0**	**Total Marks**	**200**
Credits	**12**	**Exam Hours**	**03**

Course outcomes:

At the end of the course, the student will be able to:

21ISE73.1	Identify an issue and derive problem related to society, environment, economics, energy and technology
21ISE73.2	Formulate and analyze the problem and determine the solution.
21ISE73.3	Determine, break down, and estimate the parameters needed for the solution. Then, using testing tools, assess the solution by evaluating it in light of the standard data and the objective function, as well as by applying the proper performance metrics
21ISE73.4	Create the report and take part in present / publishing the finding in a reputed conference / publication

Mapping of Course Outcomes to Program Outcomes and Program-Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21ISE73.1	3	3	3	3	3	3	2	1	3	2	3	3	3	3
21ISE73.2	3	3	3	3	3	3	2	1	3	2	3	3	3	3
21ISE73.3	3	3	3	3	3	3	2	1	3	2	3	3	3	3
21ISE73.4	3	3	3	3	3	3	2	1	3	2	3	3	3	3

- Project Executed in an Industry or at an Institution
- The CIE for the project will be 100 marks.
- The panel members for the project review comprising of Head of department, expert members, respective guide, will assess the project progress and award the CIE marks based on their evaluations. Project activities should be reported by students to the guide on a regular basis.
- For project work, the minimum CIE mark requirement is 40% of the maximum mark.
- Students will be deemed to have failed the relevant course or courses if they are unable to receive at least 40% of the CIE marks in project work. They will also not be entitled to take the project examination administered by the university. They may, however, show up for exams administered by the university in other courses taken during the same semester, including any backlog courses.
- Student team must apply the learnt concepts of software testing and carry out automation for the testing the final project outcome.
- Students will appear for the SEE after earning the required minimum CIE grades in the course or courses when they are offered during the following semester.
- If a student has already received the minimum number of points needed for a project, they are not eligible to improve their CIE scores.
- In order to pass a project or viva-voce exam, a student must receive at least 40% of the total points required for the university exam.

CIE Assessment Pattern(100 Marks)

Bloom's Category	**Tests (100 Marks)**
Remember	-
Understand	-
Apply	30
Analyze	20

	Evaluate	20
	Create	30

SEE Assessment Pattern (100 Marks – Theory)

Bloom's Category	Tests (100 Marks)
Remember	-
Understand	-
Apply	30
Analyze	20
Evaluate	20
Create	30

SCIENTIFIC FOUNDATIONS OF HEALTH

Course Code	**21ISK74**	**CIE Marks**	**50**
L:T:P:S	**1:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**1**	**Total Marks**	**100**
Credits	**1**	**Exam Hours**	**2**

Course outcomes:

At the end of the course, the student will be able to:

21ISK74.1	Understand the concepts of Health and wellness and the importance of achieving balanced good health
21ISK74.2	Implement healthy lifestyle habits effectively to enhance overall well-being
21ISK74.3	Adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus
21ISK74.4	Create the formulate strategies to fight against harmful diseases for good health through positive mindset

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21ISK74.2	-	-	-	-	-	1	-	-	-	-	-	-
21ISK74.3	-	-	-	-	-	2	-	-	-	-	-	-
21ISK74.4	-	-	-	-	-	3	-	-	-	-	-	-

MODULE-1	**GOOD HEALTH AND IT'S BALANCE FOR POSITIVE MINDSET**	**21ISK74.1**	**3 Hours**

Health -Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.

Case Study	Factors Affecting Health and Mindset
Text Book	Text Book 1: Ch. 1

MODULE-2	**BUILDING OF HEALTHY LIFESTYLES FOR BETTER FUTURE**	**21ISK74.2**	**3 Hours**

Developing healthy diet for good health, Food & health, Nutritional guidelines for good health, Obesity & overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function, How to avoid exercise injuries.

Self-study	Benefits of mindfulness practices for stress reduction and mental clarity.
Text Book	Text Book 1: Ch. 2, Text Book 3: Ch. 7

MODULE-3	CREATION OF HEALTHY AND CARING RELATIONSHIPS	21ISK74.1, 21ISK74.2	3 Hours
Building communication skills (Listening and speaking), Friends and friendship - education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviours through social engineering,			
Case Study	Guidance and support to colleagues facing challenges or seeking career advancement.		
Text Book	Text Book 1: Ch. 3		
MODULE-4	**AVOIDING RISKS AND HARMFUL HABITS**	**21ISK74.3**	**3 Hours**
Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, How addiction develops and addictive behaviors, Types of addictions, influencing factors for addictions, Differences between addictive people and non-addictive people and their behavior with society, Effects and health hazards from addictions, how to recovery from addictions			
Self-study	Study the impact of excessive sugar, salt, and saturated fats on cardiovascular health, obesity, and chronic diseases.		
Text Book	Text Book 1: Ch. 4, Text Book 3: Ch. 5,6		
MODULE-5	**PREVENTING AND FIGHTING AGAINST DISEASES FOR GOOD HEALTH**	**21ISK74.4**	**3 Hours**
Process of infections and reasons for it, Management of chronic illness for Quality of life, Health and Wellness of youth , Measuring of health & wealth status.			
Self-study	Explore diagnostic tests and their role in detecting health conditions before symptoms appear.		
Text Book	Text Book 1: Ch. 5, Text Book 2: Ch. 5		

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	Quiz
		25	15	10
L1	Remember	5	5	5
L2	Understand	5	5	5
L3	Apply	15	5	-
L4	Analyze	-	-	-
L5	Evaluate	-	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	30
L3	Apply	10
L4	Analyze	-
L5	Evaluate	-
L6	Create	-

Suggested Learning Resources:

Textbook:

1. "Scientific Foundations of Health" – Study Material Prepared by Dr. L Thimmesha, Published in VTU - University Website.
2. "Scientific Foundations of Health", (ISBN-978-81-955465-6-5) published by Infinite Learning Solutions, Bangalore – 2022.

3. Health Psychology - A Textbook, fourth edition by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press.

Reference Books:

1. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY 10017.
2. Health Psychology (Ninth Edition) by Shelley E. Taylor - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press.

Web links and Video Lectures (e-Resources):

- https://archive.nptel.ac.in/courses/109/103/109103182/
- https://www.youtube.com/watch?v=BYmQbtyNfCo
- https://www.youtube.com/watch?v=u9TFeiBc_SE
- https://archive.nptel.ac.in/courses/109/101/109101007/

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Activities to improve health, fitness, mindfulness etc.
- Case studies on healthy habits, impact of good lifestyle

EIGHTH SEMESTER

SOFTWARE ARCHITECTURE & DESIGN PATTERNS			
Course Code	**21ISE811**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

At the end of the course, the student will be able to:

21ISE811.1	Apply architecture business cycle
21ISE811.2	Interpret the importance of architectural styles and process control in various scenarios.
21ISE811.3	Recommend various quality attributes for architecture designs.
21ISE811.4	Evaluate different architectural patterns and their applications
21ISE811.5	Design software architecture for different software projects
21ISE811.6	Apply the strategies during documentation of software architecture

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21ISE811.1	3	3	3	3	-	-	-	-	-	-	-	1	3	2
21ISE811.2	3	3	3	3	-	-	-	-	-	-	-	1	3	2
21ISE811.3	3	3	3	3	-	-	-	-	-	-	-	1	3	2
21ISE811.4	3	3	3	3	-	-	-	-	-	-	-	1	3	2
21ISE811.5	3	3	3	3	-	-	-	-	-	-	-	1	3	2
21ISE811.6	3	3	3	3	-	-	-	-	-	-	-	1	3	2

MODULE-1	**INTRODUCTION**	**21ISE811.1**	**8 Hours**

Introduction: The Architecture Business Cycle: Software processes and the architecture business cycle; A good architecture principles. Software architecture guidelines; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.

Text Book	Text Book 1: 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 2.4

MODULE-2	**ARCHITECTURAL STYLES**	**21ISE811.2**	**8 Hours**

Architectural styles: Pipes and filters;Data abstraction and object-oriented organization; Event-based,implicit invocation; Layered systems; Repositories; Interpreters;Process control; Other familiar architectures; Heterogeneous architectures.

Text Book	Text Book 1: 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 2.4

MODULE-3	**SYSTEM QUALITY**	**21ISE811.3**	**8 Hours**

Functionality and architecture: Architecture and qualityattributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics

Text Book	Text Book 1:8.1,8.4,9.1,9.2,9.3, Text Book 2:5.9

MODULE-4	**ARCHITECTURAL PATTERNS**	**21ISE811.4**	**8 Hours**

Architectural Patterns: Introduction; From mud to structure: Layers, Pipes and Filters, Blackboard Distributed Systems: Broker; Interactive Systems: MVC, Presentation-Abstraction- Control. Adaptable Systems: Microkernel; Reflection

Text Book	Text Book 1: 4.2, 5.1, 5.2, 6.4

MODULE-5	DESIGNING SOFTWARE ARCHITECTURE AND DOCUMENTATION	21ISE811.5 21ISE811.6	8 Hours

Architecture in the life cycle: Designing the architecture; Formingthe team structure; Creating a skeletal system. Uses of architectural documentation; Views; Choosingthe relevant views;Documenting a view; Documentation across views.

Text Book	Text Book 1: 7.1, 7.2,7.3, 8.1, 8.2

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	15	10
L1	Remember	5	-	-
L2	Understand	5	-	-
L3	Apply	5	10	5
L4	Analyze	5	5	5
L5	Evaluate	5	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	-

Suggested Learning Resources:

Text Books:

1. Len Bass, Paul Clements, Rick Kazman: Software Architecture in Practice, 2nd Edition, Pearson Education,Re print 2019
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-OrientedSoftware Architecture, A System of Patterns, Volume 1, John Wiley and Sons, Reprint 2018.
3. Mary Shaw and David Garlan: Software Architecture- Perspectives on an Emerging Discipline, PHI, Reprint2019.

Reference Books:

1. E. Gamma, R. Helm, R. Johnson, J. Vlissides: Design Patterns-Elements of Reusable Object-Oriented Software, Pearson Education, Re print2012.

Web links and Video Lectures (e-Resources):

- Software Conceptual Design - Course (nptel.ac.in)
- Lecture - 15 Design Patterns - NPTEL Software Engineering (nptelvideos.com)

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning
• Flip class room • Activity-based discussions on application of design pattern in solving real world issues. • Quiz and online assessment to bring awareness about various design patterns

MANAGEMENT AND ENTREPRENEURSHIP			
Course Code	**21ISE812**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

At the end of the course, the student will be able to:

21ISE812.1	Understand the basic principles and concepts of management.
21ISE812.2	Analyze the internal/external factors affecting a business/organization to evaluate business opportunities.
21ISE812.3	Understand how to manage people, processes, and resources within a diverse organization.
21ISE812.4	Demonstrate the functions, types and roles of an entrepreneur.
21ISE812.5	Describe the features of small-scale industries and understand the institutional support provided for entrepreneurship.
21ISE812.6	Summarize the preparation of project report, need significance of report. Also to explain about industrial ownership

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21ISE812.1	3	2	1	1	-	-	-	-	-	1	3	3	3	3
21ISE812.2	3	2	1	1	-	-	-	-	-	1	3	3	3	3
21ISE812.3	3	2	1	1	-	-	-	-	-	1	3	3	3	3
21ISE812.4	3	2	1	1	-	-	-	-	-	1	3	3	3	3
21ISE812.5	3	2	1	1	-	-	-	-	-	1	3	3	3	3
21ISE812.6	3	2	1	1	-	-	-	-	-	1	3	3	3	3

MODULE-1	**INTRODUCTION OF MANAGEMENT AND PLANNING**	**21ISE812.1**	**8 Hours**

Introduction – Meaning, nature and characteristics of management, scope and functional areas of management, goals of management, levels of management, brief overview of evolution of management. Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of organization.

Text Book	Text Book 1: Chapter 1

MODULE-2	**STAFFING, CONTROLLING, COMMUNICATION AND COORDINATION**	**21ISE812.3**	**8 Hours**

Staffing- meaning, process of recruitment and selection. Directing and controlling- meaning and nature of directing, leadership styles, motivation theories. Controlling- meaning, steps in controlling, methods of establishing control, Communication- Meaning and importance, Coordination- meaning and importance

Text Book	Text Book 1: Chapter 2, 3

MODULE-3	**BASIC KNOWLEDGE ABOUT ENTREPRENEURSHIP**	**21ISE812.2**	**8 Hours**

		21ISE812.4	
Entrepreneur – meaning of entrepreneur, types of entrepreneurship, stages of entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India, barriers to entrepreneurship. Identification of business opportunities- market feasibility study, technical feasibility study, financial feasibility study and social feasibility study.			
Text Book	Text Book 1: Chapter 5		
MODULE-4	**MARKETING AND ADVERTISING**	**21ISE812.5** **21ISE812.6**	**8 Hours**
Marketing Management - Definition of Marketing, Marketing Concept, Objectives and Functions of Marketing. Marketing Research - Meaning; Definition; Objectives; Importance; Limitations; Process. Advertising - Meaning of Advertising, Objectives, Functions, Criticism.			
Text Book	Text Book 1: Chapter 6		
MODULE-5	**FINANCIAL MANAGEMENT**	**21ISE812.5** **21ISE812.6**	**8 Hours**
Financial Management - Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the Concept of Capital Structure and Various Sources of Finance.			
Text Book	Text Book 1: Chapter 7		

CIE Assessment Pattern(50 Marks – Theory) –

RBT Levels		**Marks Distribution**		
		Test (s)	**Qualitative Assessment (s)**	**MCQ's**
		25	**15**	**10**
L1	**Remember**	5	-	**-**
L2	**Understand**	5	-	-
L3	**Apply**	5	5	5
L4	**Analyze**	5	5	5
L5	**Evaluate**	5	5	-
L6	**Create**	**-**	-	-

SEE Assessment Pattern(50 Marks – Theory)

RBT Levels		**Exam Marks Distribution (50)**
L1	**Remember**	10
L2	**Understand**	10
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	10
L6	**Create**	-

Suggested Learning Resources:

Text Books:

1. Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 4th / 6th Edition, 2010.
2. Dynamics of Entrepreneurial Development & Management -Vasant Desai Himalaya Publishing House.

Reference Books:

1. Management Fundamentals -Concepts, Application, Skill Development Robert Lusier – Thomson.
2. Entrepreneurship Development -S S Khanka -S Chand & Co.

Web links and Video Lectures (e-Resources):

- http://dspace.vnbrims.org:13000/xmlui/bitstream/handle/123456789/4983/Management%20and%20Entrepreneurship.pdf?sequence=1

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- NPTEL course
- Contents related activities (Activity-based discussions)
- For active participation of students, instruct the students to solve and analyze various algorithms

VIRTUAL REALITY AND AUGMENTED REALITY

Course Code	**21ISE813**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

At the end of the course, the student will be able to:

21ISE813.1	Explain fundamentals of Virtual Reality Systems
21ISE813.2	Summarize the Fundamentals of VR and hardware and software of the Virtual Reality
21ISE813.3	Analyze the applications of Virtual Reality
21ISE813.4	Illustrate technology, underlying principles, its potential and limits
21ISE813.5	Describe the criteria for defining useful applications and the Process of creating Virtual environments.
21ISE813.6	Explain fundamentals of Augmented Reality Systems

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21ISE813.1	3	2	2	2	-	-	-	-	-	-	-	1	2	2
21ISE813.2	3	2	2	1	-	-	-	-	-	-	-	1	2	2
21ISE813.3	3	3	2	2	-	-	-	-	-	-	-	1	2	2
21ISE813.4	3	2	2	2	-	-	-	-	-	-	-	1	2	2
21ISE813.5	3	2	2	2	-	-	-	-	-	-	-	1	2	2
21ISE813.6	3	3	2	2	-	-	-	-	-	-	-	1	2	2

MODULE-1	**INTRODUCTION TO VR**	**21ISE813.1**	**8 Hours**

Introduction: The three I's of virtual reality, commercial VR technology and the five classic components of a VR system. Input Devices: Three-dimensional position trackers, navigation and manipulation.

Self-study / Case Study / Applications	The Effects of Fully Immersive Virtual Reality on the Learning of Physical Tasks.
Text Book	Text Book 1: 1.1, 1.3, 1.5, 2.1, 2.2 and 2.3

MODULE-2	**OUTPUT DEVICES**	**21ISE813.2**	**8 Hours**

Gesture Interfaces - The Pinch Glove, The 5DT Data Glove, The Didji glove, The Cyber Glove. Output Devices: Graphics displays, sound displays & haptic feedback.

Text Book	Text Book 1: 3.1,3.2,3.3		
MODULE-3	**MODELING**	**21ISE813.3**	**8 Hours**
Modeling: Geometric modeling, Kinematics Modeling, Physical Modeling, behavior modeling, model management			
Self-study / Case Study / Applications	Development and Analysis of VR Technician Training and Methods		
Text Book	Text Book 1: 5.1, 5.2, 5.4 and 5.5		
MODULE-4	**HUMAN FACTORS AND APPLICATIONS OF VR**	**21ISE813.4, 21ISE813.5**	**8 Hours**
Human Factors: Methodology and terminology, user performance studies, VR health and safety issues. Applications of VR: Medical, Military, Robotics applications, Applications of Virtual Reality in Manufacturing			
Self-study / Case Study / Applications	A Modular Interactive Virtual Surgical Training Environment. Virtual Reality Training Improves Operating Room Performance, *VR is as effective for training a military-**based** task as desktop-based training.*		
Text Book	Text Book 1: 7.1, 7.2 and 7.3 Text Book 2:8.1,8.3,9.1 and 9.2		
MODULE-5	**AUGMENTED REALITY**	**21ISE813.6**	**8 Hours**
Introduction - Defining augmented reality, history of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, applications of augmented reality, Augmented Reality Concepts- Working principles of Augmented Reality. visualization techniques for augmented reality.			
Self-study / Case Study / Applications	Visualization techniques for augmented reality.		
Text Book	Text Book 3: 1.1 to 1.8,2.1 to 2.5		

CIE Assessment Pattern (50 Marks – Theory) –

RBT Levels		**Marks Distribution**		
		Test (s)	**Qualitative Assessment (s)**	**MCQ's**
		25	**15**	**10**
L1	**Remember**	5	-	-
L2	**Understand**	5	-	-
L3	**Apply**	5	5	5
L4	**Analyze**	5	5	5
L5	**Evaluate**	5	5	-
L6	**Create**	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		**Exam Marks Distribution (50)**
L1	**Remember**	10
L2	**Understand**	10
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	10

L6	**Create**	--

Suggested Learning Resources:

Text Books:

1. 1.Samuel Greengard, Steven Jay Cohen, "Virtual Reality", Gilden Media, First Edition, 2019.
2. Gregory C. Burdea& Philippe Coiffet, "Virtual Reality Technology", Second Edition, John Wiley& Sons, 2006
3. 3.Allan Fowler-AR Game Development||, 1st Edition, A press Publications, 2018, ISBN 978-1484236178

Reference Books:

1. Jason Jerald, "The VR Book: Human-Centered Design for Virtual Reality", ACM Books, First Edition, 2015.
2. Tony Parisi, "Learning Virtual Reality", O'Reilly, First Edition, 2015.

Web links and Video Lectures (e-Resources):

- https://techooid.com/input-devices-vr
- https://www.marxentlabs.com/what-is-virtual-reality/
- https://www.techtarget.com/whatis/definition/virtual-reality

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Demonstration of VR input and output devices.
- Demonstration graphics, sound feed back
- Demonstration of modeling techniques
- Video demonstration of latest trends in Virtual Reality
  - Organizing Group wise discussions on Applications of VR
  - Seminars

QUANTUM COMPUTING

Course Code	**21ISE814**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

At the end of the course, the student will be able to:

21ISE814.1	Understand the basics of quantum computing.
21ISE814.2	Understand the background of Quantum Mechanics.
21ISE814.3	Analyse the computation models.
21ISE814.4	Model the circuits using quantum computation.
21ISE814.5	Analyse the quantum operations such as noise and error–correction.
21ISE814.6	Analyse the need of quantum computing.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21ISE814.1	3	2	2	2	2	-	-	-	-	-	-	-	2	2
21ISE814.2	3	2	2	2	2	-	-	-	-	-	-	-	2	2
21ISE814.3	3	2	2	2	2	-	-	-	-	-	-	-	2	2

21ISE814.4	3	2	2	2	2	-	-	-	-	-	-	-	2	2
21ISE814.5	3	2	2	2	2	-	-	-	-	-	-	-	2	2
21ISE814.6	3	2	2	2	2	-	-	-	-	-	-	-	2	2

MODULE-1	**Introduction to Quantum Computing**	**21ISE814.1**	**8 Hours**
Introducing quantum mechanics: Introduction & Types of Computing, History of Classical Electronic Computing and Quantum Computing, How Is a Quantum Computer Different, Quantum kinematics, quantum dynamics, quantum measurements. Single qubit, multiqubits, gates.			
Text Book	Text Book 1: 1.2, 1.3, 2.1,2.2,2.3,2.4,2.5,3.2		
MODULE-2	**Matrices & Operators**	**21ISE814.2**	**8 Hours**
Cryptography, classical cryptography, introduction to quantum cryptography. BB84, B92 protocols. Introduction to security proofs for these protocols. quantum key distribution, Quantum error correction			
Text Book	Text Book 1: 2.2,1.1,4.2,3.4		
MODULE-3	**Quantum Cryptography**	**21ISE814.3**	**8 Hours**
Cryptography, classical cryptography, introduction to quantum cryptography. BB84, B92 protocols. Introduction to security proofs for these protocols. quantum key distribution, Quantum error correction			
Text Book	Text Book 1:8.1,8.4,9.1,9.2,9.3, Text Book 1:5.9		
MODULE-4	**Quantum gates and algorithms**	**21ISE814.4**	**8 Hours**
Quantum gates and algorithms: Universal set of gates, quantum circuits Single Qubit Gates; Quantum Not Gate, Pauli-X,Y and Z Gates, Hadamard Gate, Phase Gate or S Gate T Gate or 8 Gate Multiple Qubit Gates; Controlled Gates, Controlled Not Gate or CNOT Gate, Swap Gate, Controlled Z Gate, Toffoli Gate			
Text Book	Text Book 1: 11.3,12.1,12.2, Text Book 1: 11.3,12.1,12.2		
MODULE-5	**Quantum Algorithms**	**21ISE814.5, 21ISE814.5**	**8 Hours**
Classical computation on quantum computers, Relationship between quantum and classical com plexity classes. Deutsch-Jozsa algorithm, Grover's quantum search algorithm, Simon's algorithm. Shor's quantum factorization algorithm. Bernstein Vazirani Algorithm			
Text Book	Text Book 1: 11.3,12.1,12.2		

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		**Marks Distribution**		
		Test (s)	**Qualitative Assessment (s)**	**MCQ's**
		25	**15**	**10**
L1	**Remember**	5	-	-
L2	**Understand**	5	-	-
L3	**Apply**	5	10	5
L4	**Analyze**	5	5	5
L5	**Evaluate**	5	-	-
L6	**Create**	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	10
L2	**Understand**	10
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	10
L6	**Create**	-

Suggested Learning Resources:

Text Books:

1) Edward Franklin (Author), Madison Matti Charlton, "Mastering Quantum Computing: Practical Applications and Programming", Telephasic Workshop, 2024

2)John Gribbin (Author), "Quantum Computing from Colossus to Qubits: The History, Theory, and Application of a Revolutionary Science", 2024

3) Kuldeep Singh Kaswan, Jagjit Singh Dhatterwal, Anupam Baliyan, Shalli Rani, "Quantum Computing: A New Era of Computing", Wiley-IEEE Press, July 2023

Reference Books:

1) Nikhil Ranjan Roy (Author), Kuntal Mukherjee (Author), "Introductory Quantum Computing: A Practical Approach Using Python", S Chand and Company Ltd, 2024

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/106106232
- https://www.coursera.org/learn/introduction-to-quantum-information
- https://www.udemy.com/course/quantum-computers/?couponCode=THANKSLEARNER24
- https://www.youtube.com/watch?v=evTGcFnLu1g

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- NPTEL course
- Contents related activities (Activity-based discussions)
- For active participation of students, instruct the students to solve and analyze various algorithms

PROMPT ENGINEERING

Course Code	**21ISE815**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**4**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

At the end of the course, the student will be able to:

21ISE815.1	Summarize how prompt engineering aligns with specific requirements.
21ISE815.2	Categorize various prompt engineering techniques.
21ISE815.3	Construct prompt engineering models for critical social issues.
21ISE815.4	Assess prompt engineering models by analyzing design and development principles.
21ISE815.5	Illustrate potential risks and misuse scenarios in prompt engineering through relevant case studies.

21ISE815.6	Explore different applications and tools within the field of prompt engineering.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21ISE815.1	3	3	2	2	3	-	-	-	-	-	-	-	3	-
21ISE815.2	3	3	2	2	3	-	-	-	-	-	-	-	3	-
21ISE815.3	3	3	2	2	3	-	-	-	-	-	-	-	3	-
21ISE815.4	3	3	2	2	3	-	-	-	-	-	-	-	3	-
21ISE815.5	3	3	2	2	3	-	-	-	-	-	-	-	3	-
21ISE815.6	3	3	2	2	3	-	-	-	-	-	-	-	3	-

MODULE-1	**Mastering Prompts: Foundations, Formatting, Elements, and Effective Design**	**21ISE815.1**	**8 Hours**
Basics of Prompting Prompt Formatting, Prompt Elements, General Tips for Designing Prompts: The Instruction, Specificity, Avoiding Impreciseness. -Examples of Prompts: Text Summarization, Information Extraction, Question Answering, Text Classification, Conversation, Code Generation.			
Text Book	Text Book1: 1		
MODULE-2	**Advanced Prompting Strategies - 1**	**21ISE815.2**	**8 Hours**
Zero-Shot Prompting, Few-Shot Prompting, Chain-of-Thought Prompting, Self-Consistency, Generate Knowledge Prompting, Tree of Thoughts (ToT), Retrieval Augmented Generation (RAG), Automatic Reasoning and Tool-use (ART), Automatic Prompt Engineer, Active-Prompt, Directional Stimulus Prompting, ReAct Prompting, Multimodal CoT Prompting, Graph Prompting.			
Text Book	Text Book1: 2		
MODULE-3	**Advanced Language Models: FLAN, ChatGPT, LLaMA, and GPT-4**	**21ISE815.3, 21ISE815.4**	**8 Hours**
Fine-tuned LAnguage Net (FLAN), ChatGPT: Introduction, Reviewing the Conversation Task, Multi-turn Conversations, Single-turn tasks. - Large Language Model Meta AI (LLaMA), GPT-4: Introduction, Vision Capabilities, Steering GPT-4, Limitations. - Model Collection.			
Text Book	Text Book1: 3		
MODULE-4	**Adversarial Prompting: Challenges, Strategies,and Ethical Considerations in AI**	**21ISE815.5**	**8 Hours**
Adversarial Prompting: Prompt Injection, Prompt Leaking, Jail breaking, Illegal Behavior, Do Anything Now(DAN), The Waluigi effect, Defense Tactics, Add Defense in the Instruction, Parameterizing Prompt Components, Quotes and Additional Formatting, Adversarial Prompt Detector. - Factuality, Biases: Distribution of Exemplars, Order of Exemplars.			
Text Book	Text Book1: 4		
MODULE-5	**Development with Program-Aided LanguageModels and AI-Powered Tools**	**21ISE815.6**	**8 Hours**
Program-Aided Language Models, Generating Data, Generating Code, Turn Comments into Code, Complete Functions, MySQL Query Generation, Explain Code, Editing Code, Debugging Code. Tools: AI Test Kitchen, ChatGPT Prompt Generator, DreamStudio, OpenAI Playground, Visual Prompt Builder.			
Text Book	Text Book1: 5		

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment	Quiz
		25	15	10
L1	Remember	5	-	-
L2	Understand	5	-	-
L3	Apply	5	5	5
L4	Analyze	5	5	5
L5	Evaluate	5	5	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	-

Suggested Learning Resources:

Text Books:

1. The Art of Prompt Engineering with Chatgpt: A Hands-On Guide, Nathan Hunter, 2023

Reference Books:

1. Prompt Engineering for Generative AI, James Phoenix, Mike Taylor, ISBN: 9781098153373, O'ReillyMedia, Inc., 2023
2. Prompt Engineering, Padmaraj Nidagundi, https://www.amazon.com/dp/B0BLR6T2MT, 2022

Web links and Video Lectures (e-Resources):

- https://www.classcentral.com/classroom/youtube-chatgpt-prompt-engineering-course- 146290/641948750c9e7
- https://www.upgrad.com/advanced-certificate-program-generative-ai/
- https://www.udemy.com/course/prompt-engineering
- https://openai.com/blog/chatgpt
- https://www.promptingguide.ai/
- https://www.youtube.com/watch?v=dOxUroR57xs

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Prompt Creation Workshops:
  - Participate in creating prompts for various tasks with different prompt styles and formatsto understand their impact on model performance.
- Prompt Analysis and Critique:
  - Analyze and critique the designed prompts. Discuss the strengths and weaknesses of eachprompt and how they could be improved.
- Prompt Optimization Challenges:
  - Optimize prompts for specific tasks or objectives. This can include making prompts moreconcise, clear, or effective in eliciting desired responses.
- Prompt Fine-Tuning Exercises:
  - Fine-tune the prompts for specific language models or tasks and evaluate the performanceimprovements.
- Prompt Modification Scenarios:

- Discuss the scenarios where you can modify prompts to handle changing requirements or adapt to new data. This helps to understand the dynamic nature of prompt engineering.

TECHNICAL SEMINAR

Course Code	**21ISE82**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**-**
Hrs / Week	**0**	**Total Marks**	**50**
Credits	**1**	**Exam Hours**	**3**

Course outcomes:

At the end of the course, the student will be able to:

21ISE82.1	Identify an engineering or societal problem, analyse it and propose a work plan to solve it.
21ISE82.2	Develop skills in doing literature survey, technical presentation and report preparation.
21ISE82.3	Deliver the current topic of professional interest and present it before an audience
21ISE82.4	Develop his communication skills, self-confidence and time management.

Mapping of Course Outcomes to Program Outcomes and Program-Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21ISE82.1	3	3	3	1	-	-	-	-	-	-	-	3	3	3
21ISE82.2	3	3	3	1	-	-	-	-	-	-	-	3	3	3
21ISE82.3	3	3	3	1	-	-	-	-	-	-	-	3	3	3
21ISE82.4	3	3	3	1	-	-	-	-	-	-	-	3	3	3

General Instructions:

i. Students are informed to strictly adhere by the stipulated timeline for seminar.
ii. Attendance of all students is mandatory for all seminars.
iii. Students should choose their respective topics along with abstracts (50–100 words) and no similarity should be found between the topics.
iv. Topics chosen by the students should be based on articles that appear in SCOPUS indexed journals, clearly indicating the volume, issue and year of publication. A minimum of 5 articles are to be referred for preparation. Seminar topic must be on emerging technical areas.
v. For report and slide preparation, students are suggested to contact the coordinators.
vi. Hard copy of the seminar report is to be submitted.

CIE Assessment Pattern(50 Marks)

Bloom's Category		**Tests (50 Marks)**
L1	**Remember**	-
L2	**Understand**	10
L3	**Apply**	20
L4	**Analyze**	20
L5	**Evaluate**	-
L6	**Create**	-

Research Internship/ Industry Internship /Rural Internship			
Course Code	**21ISE83**	**CIE Marks**	**100**
L:T:P:S	**0:0:12:0**	**SEE Marks**	**100**
Hrs / Week	**0**	**Total Marks**	**200**
Credits	**12**	**Exam Hours**	**03**

Course outcomes:

At the end of the course, the student will be able to:

21ISE83.1	Students should be able to understand advanced application development concepts.
21ISE83.2	Students should be able to implement technical module/unit as project as per industry requirements
21ISE83.3	Determine, break down, and estimate the parameters needed for the solution. Then, using testing tools, assess the solution by evaluating it in light of the standard data and the objective function, as well as by applying the proper performance metrics
21ISE83.4	Create the report and take part in presentation.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21ISE83.1	3	3	3	3	3	3	2	1	3	1	3	3	3	3
21ISE83.2	3	3	3	3	3	3	2	1	3	1	3	3	3	3
21ISE83.3	3	3	3	3	3	3	2	1	3	1	3	3	3	3
21ISE83.4	3	3	3	3	3	3	2	1	3	1	3	3	3	3

Description:

The student shall be capable of identifying a problem related to the field of Information Science and Engineering and carry out an internship on the problem defined. The code developed during the internship will be reviewed by a panel of experts. Plagiarized implementation will automatically getan **"F" GRADE** and the student will be liable for further disciplinary action. At the completion of aninternship the student will submit a report, which will be evaluated by duly appointed examiner(s).

Evaluation Stages:

Activity	**Evaluation Attribute**
Abstract Submission	Problem Statement
Review-I	Algorithm and outline design
Review-II	Partial code development and or partial execution
Review-III	Final Implementation PPT(10-12 slides) + Results verification + Report Submission in defined format

Recommended Application domains:

1) Data Sciences
2) Cyber Security
3) Data Mining
4) Societal Issues
5) Healthcare
6) Surveillance and security
7) Enterprise Resource Planning
8) Data Management & application
9) Interdisciplinary application, etc.,

CIE Assessment Pattern(50 Marks)

Bloom's Category		Tests (50 Marks)
L1	**Remember**	-
L2	**Understand**	10
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	10
L6	**Create**	10

SEE Assessment Pattern (50 Marks – Theory)

Bloom's Category		Tests (50 Marks)
L1	**Remember**	-
L2	**Understand**	10
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	10
L6	**Create**	10

NATIONAL SERVICE SCHEME (NSS)			
Course Code	**21NSS84**	**CIE Marks**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**00**	**Exam Hours**	**2**

Course outcomes:

At the end of the course, the student will be able to:

21NSS84.1	Understand the importance of his / her responsibilities towards society
21NSS84.2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.
21NSS84.3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
21NSS84.4	Implement government or self-driven projects effectively in the field.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21NSS84.1	-	-	-	-	-	3	1	1	3	2	2	1
21NSS84.2	-	-	-	-	-	3	1	1	3	2	2	1
21NSS84.3	-	-	-	-	-	3	1	1	3	2	2	1
21NSS84.4	-	-	-	-	-	3	1	1	3	2	2	1

Semester	CONTENT	HOURS
5th to 8th	**PART A** ONENSS–CAMP @College/University/State or Central Govt Level/ NGO's/General Social Camps **PART B** 1. Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing 2. Waste management–Public, Private and Govtorganization,5R's. 3. Setting of the information imparting club for women leading to contribution in social and economic issues. 4. Water conservation techniques–Role of different stakeholders–Implementation. 5. Preparing an actionable business proposal for enhancing the village income and approach for implementation. 6. Helping local schools to achieve good results and enhance their enrolment in Higher/technical/vocational education. 7. Developing Sustainable Water management system for rural areas and implementation approaches.	Total 32 Hrs/ Semester 2 Hrs/week
	8. Contribution to any national level initiative of Government of India. For. eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc. 9. Spreading public awareness under rural outreach programs. (minimum5programs). 10. Organize National integration and social harmony events/workshops / Seminars. (Minimum02programs). 11. Govt. school Rejuvenation and helping them to achieve good infrastructure.	

CIE Assessment Pattern (50 Marks – Practical) –

1. **PART A:** Compulsorily students have to attend one camp.
2. **PART B:** Students have to take up anyone activity on the above said topics and have to prepare content for awareness and technical contents for implementation of the projects and have to present strategies for implementation of the same.
3. CIE will be evaluated based on their presentation, approach and implementation strategies.

CIE Components	Marks
Presentation1-Selection of topic-(phase1)	10
Experiential Learning Presentation 2 (phase2)	10
Case Study-based Teaching-Learning	10
Sector-wise study & consolidation	10
Video based seminar (4-5 minutes per student)	10
Total	**50**

SEE Assessment Pattern (50 Marks – Practical)

- Implementation strategies of the project with report duly signed by the Dept's Coordinator, HoD and Principal.
- At last it should be evaluated by the NSS Coordinator.
- Finally consolidated report should be sent to the University.

Suggested Learning Resources:

Reference Books:

1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.

Pre-requisites to take this Course:

1. Students should have a service-oriented mindset and social concern.
2. Students should have dedication to work at any remote place, anytime with available resources and proper time management for the other works.
3. Students should be ready to sacrifice some of the time and wishes to achieve service-oriented targets on time.

PHYSICAL EDUCATION (PE) (SPORTS AND ATHLETICS)

Course Code	**21PES84**	**CIE Marks**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**00**	**Exam Hours**	**02**

Course outcomes:

At the end of the course, the student will be able to:

21PES84.1	Demonstrate the starting and finishing positions of different track and jump events.
21PES84.2	Demonstrate the holding and releasing stances in various throwing events, and takeoff and landing position in various jumping events of Athletics.
21PES84.3	Demonstrate the specific skills and techniques of the selected game/event.
21PES84.4	Demonstrate and describe the rules and regulations of specific games.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21PES84.1	-	-	-	-	-	-	-	1	2	-	-	1

21PES84.2	-	-	-	-	-	-	-	1	2	-	-	1
21PES84.3	-	-	-	-	-	-	-	1	2	-	-	1
21PES84.4	-	-	-	-	-	-	-	1	2	-	-	1

Semester	**CONTENT**	**HOURS**
5th	**Fitness Components:** Meaning and Importance, Fit India Movement, Definition of fitness, Components of fitness, Benefits of fitness, Types of fitness and Fitness tips. **Practical Components:** Speed, Strength, Endurance, Flexibility, and Agility **Athletics**: 1. Track -Sprints: • Starting Techniques: Standing start and Crouch start(its variations)use of Starting Block. • Acceleration with proper running techniques. • Finishing technique: Run Through, Forward Lunging and Shoulder Shrug. 2. Jumps- Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick)and Landing 3. Throws- Shot Put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique) **Kabaddi OR Kho-Kho** **Kabaddi:** A. Fundamental skills 1. Skills in Raiding: Touching with hands, Use of leg-toe touch, squat leg thrust, side kick, mule kick, arrow fly kick, crossing of baulk line. Crossing of Bonus line. 2. Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques. 3. Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defense. 4. Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of the officials. **Kho-Kho:** A Fundamental skills 1. Skills in Chasing: Sit on the box (Parallel &Bullet toe method),Getup from the box(Proximal & Distal foot method),Give Kho(Simple,Early, Late& Judgment),Pole Turn, Pole Dive, Tapping, Hammering, Rectification of foul. 2. Skills in running: Chain Play, Ring play and Chain & Ring mixed play. 3. Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of the officials.	Total 32 Hrs/ Semester 2 Hrs/week
6th	**Athletics**: 1. Track -110 Mtrs and 400Mtrs: • Hurdling Technique: Lead leg Technique, Trail leg Technique, Side Hurdling, Over the Hurdles • Crouch start (its variations)use of Starting Block.	

- Approach to First Hurdles, In Between Hurdles, Last Hurdles to Finishing.

2. Jumps- High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing.
3. Throws- Discus Throw: Holding the Discus, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle).

Volleyball OR Throw Ball

Volleyball:

A. Fundamental skills

1. Service: Under arm service, Side arm service, Tennis service, Floating service.
2. Pass: Under arm pass, Over-head pass.
3. Spiking and Blocking.
4. Game practice with application of Rules and Regulations

B. Rules and their interpretation and duties of officials.

Throw Ball:

A. Fundamental skills:

Over hand service, Side arm service, two hand catching, one hand over head return, side arm return.

B. Rules and their interpretations and duties of officials

Football OR Hockey

Football:

A. Fundamental Skills

1. Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick.
2. Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot.
3. Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot.
4. Heading: In standing, running and jumping condition.
5. Throw-in: Standing throw-in and Running throw-in.
6. Feinting: With the lower limb and upper part of the body.
7. Tackling: Simple Tackling, Slide Tackling.
8. Goal Keeping: Collection of Ball, Ball clearance-kicking, throwing and deflecting.
9. Game practice with application of Rules and Regulations.

C. Rules and their interpretation and duties of officials.

Hockey:

A. Fundamental Skills

1. Passing: Short pass, Longpass, pushpass, hit
2. Trapping.

3. Dribbling and Dozing
4. Penalty stroke practice.
5. Penalty corner practice.

	6. Tackling: Simple Tackling, Slide Tackling. 7. Goal Keeping, Ball clearance- kicking, and deflecting. 8. Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	
7th	**Athletics**: 1. Track -Relay Race: • Starting, Baton Holding/Carrying, Baton Exchange in between zone, and Finishing • Crouch start (its variations) use of Starting Block. • Approach to First Hurdles, In Between Hurdles, Last Hurdles to Finishing. 2. Jumps- Triple Jump: Approach Run, Take-off, Flight in the Hop, Step, Jump and Landing 3. Throws- Javelin Throw: Grip, Carry, and Recovery (3/5 Impulse stride). Release **Cricket OR Baseball** **Cricket:** A. Fundamental skills 1. Batting- Forward Defense Stroke, Backward Defense Stroke, OffDrive, On Drive, Straight Drive, Cover Drive, Square Cut. 2. Bowling-Out-swing, In-swing Off Break, Leg Break and Googly. 3. Fielding: Catching - The High Catch, The Skim Catch, The Close Catch and throwing at the stumps from different angles. Long Barrier and Throw, Short Throw, Long Throw, Throwing on the Turn. 4. Wicket Keeping B. Rules and their interpretation and duties of officials. **Baseball:** A. Fundamental skills: 1. Player Stances – walking, extending walking, L stance, cat stance Grip – standard grip, choke grip 2. Batting – swing and bunt. 3. Pitching 4. Baseball: slider, fast pitch, curve ball, drop ball, rise ball, change up, knuckle ball, screw ball B. Rules and their interpretations and duties of officials **Basketball OR Net Ball** **Basketball:** A. Fundamental Skills 1. Passing: Two hand Chest Pass, Two hands Bounce Pass, One hand Baseball Pass, Side arm Pass, Overhead Pass, Hook Pass. 2. Receiving: Two hand receiving, One hand receiving, Receiving in stationary position, Receiving while Jumping and Receiving while Running. 3. Dribbling: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble. 4. Shooting: Lay-up shot and its variations, One hand set shot, Two hands jump shot, Hook shot, Free Throw. 5. Rebounding: Defensive rebound and Offensive rebound. 6. Individual Defence: Guarding the player with the ball and without	

	the ball, Pivoting. 7. Game practice with application of Rules and Regulations. **Netball:** A. Fundamental Skills 1. Catching: one handed, two handed, with feet grounded and in flight. 2. Throwing (Different passes and their uses): One hand passes (shoulder, high shoulder, underarm, bounce, lob), two hand passes (Push, overhead and bounce). 3. Footwork: Landing on one foot, landing on two feet, Pivot, Running pass. 4. Shooting: One hand, forward step shot, and backward step shot. 5. Techniques of free dodge and sprint, sudden sprint, sprint and stop, sprinting with change at speed. 6. Defending: Marking the player, marking the ball, blocking, inside the circle, outside the circle. Defending the circle edge against the passing. 7. Intercepting: Pass and shot. 8. Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	
8th	**Athletics**: A. Track -Combined Events: a. Heptathlon all the 7 events b. Decathlon: All 10 Events B. Jumps- Pole Vault: Approach Run, Planting the Pole, Take-off, Bar Clearance and Landing. C. Throws- Hammer Throw: Holding the Hammer, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle). **Shuttle Badminton OR Table Tennis** **Shuttle Badminton:** A. Fundamental skills D. Basic Knowledge: Various parts of the Racket and Grip. E. Service: Short service, Long service, Long-high service. F. Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash. G. Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials. **Table Tennis:** A. Fundamental skills: 1. Basic Knowledge: Various parts of the Racket and Grip(Shake Hand & PenHold Grip). 2. Stance: Alternate & Parallel. 3. Push and Service: Backhand &Forehand. 4. Chop: Backhand & Forehand. 5. Receive: Push and Chop with both Backhand & Forehand. 6. Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of officials	

Handball OR Ball Badminton

Handball:

A. Fundamental Skills
1. Catching, Throwing and Ball control,
2. Goal Throws: Jumpshot, Centershot, Diveshot, Reverseshot.
3. Dribbling: High and low.
4. Attack and counter attack, simple counter attack, counter attack from two wings and center.
5. Blocking, Goal Keeping and Defensive skills.
6. Game practice with application of Rules and Regulations.

B. Rules and their interpretations and duties of officials

Ball badminton:

A. Fundamental Skills
1. Basic Knowledge: Various parts of the Racket and Grip.
2. Service: Short service, Long service, Long-high service.
3. Shots: Overhead shot, Defensive clearshot, Attacking clearshot, Dropshot, Netshot, Smash.
4. Game practice with application of Rules and Regulations.

B. Rules and their interpretation and duties of officials.

CIE Assessment Pattern (50 Marks – Practical) –

CIE to be evaluated every semester end based on practical demonstration of Sports and Athletics activities learnt in the semester.

CIE	Marks
5th Semester	10
6th Semester	10
7th Semester	15
8th Semester	15
Total	**50**

SEE Assessment Pattern (50 Marks – Practical)	
SEE	**Marks**
Athletics	20
Kabaddi OR Kho-Kho	05
Volleyball / Throw ball	05
Football/Hockey	05
Netball/Basketball	05
Shuttle Badminton / Table Tennis	05
Handball/ Badminton	05
Total	**50**

Suggested Learning Resources:

Reference Books:

1. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
2. Bandopadhyay,K. Sarir Siksha Parichay, Classic Publishers, Kolkata.
3. Petipus, etal. Athlete's Guide to Career Planning, Human Kinetics.
4. Dharma,P.N. Fundamentals of Track and Field, Khel Sahitya Kendra, NewDelhi.
5. Jain,R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi.

6. Vivek Thani, Coaching Cricket ,Khel Sahitya Kendra, NewDelhi.
7. Saha,A.K.Sarir SiksherRitiniti,RanaPublishingHouse,Kalyani.
8. Bandopadhyay,K. Sarir Siksha Parichay, Classic Publishers, Kolkata
9. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, NewDelhi.
10. Dubey,H.C. Basketball, Discovery Publishing House, NewDelhi.
11. RachanaJain, Teach Yourself Basketball, Sports Publication.
12. JackNagle,Power Pattern Offences for Winning basketball,ParkerPublishingCo.,NewYork.
13. RenuJain, Play and Learn Basketball, Khel Sahitya Kendra,NewDelhi.
14. SallyKus, Coaching Volleyball Successfully, HumanKinetics.
15. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
16. Bandopadhyay, K.Sarir Siksha Parichay, Classic Publishers, Kolkata

YOGA

Course Code	**21YOG84**	**CIE Marks**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**00**	**Exam Hours**	**02**

Course outcomes:

At the end of the course, the student will be able to:

21YOG84.1	Use Yogasana practices in an effective manner
21YOG84.2	Become familiar with an authentic foundation of Yogic practices
21YOG84.3	Practice different Yogic methods such as Suryanamaskara, Pranayama and some of the Shat Kriyas
21YOG84.4	Use the teachings of Patanjali in daily life .

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21YOG84.1	-	-	-	-	-	3	-	-	2	-	-	1
21YOG84.2	-	-	-	-	-	3	-	-	2	-	-	1
21YOG84.3	-	-	-	-	-	3	-	-	2	-	-	1
21YOG84.4	-	-	-	-	-	3	-	-	2	-	-	1

Semester	CONTENT	HOURS
5th	**Introduction of Yoga:** Aim and Objectives of yoga, Prayer: Yoga,its origin ,history and development. Yoga, its meaning, definitions. Different schools of yoga, importance of prayer **Brief introduction of yogic practices for common man:** Yogic practices for common man to promote positive health **Rules and regulations:** Rules to be followed during yogic practices by practitioner **Misconceptions of yoga:** Yoga its misconceptions, Difference between yogic and non-yogic practices. **Suryanamaskara:** 1. Suryanamaskar prayer and its meaning, Need, importance and benefi Suryanamaskar. 2. Suryanamaskar 12 count,2rounds **Kapalabhati:** Meaning, importance and benefits of Kapalabhati - 40strokes/min3rounds **Different types of Asanas**:	Total 32 Hrs/ Semester

	1. Sitting: Padmasana, Vajrasana, Sukhasana 2. Standing: Vrikshana, Trikonasana, Ardhakati Chakrasana 3. Prone line: Bhujangasana, Shalabhasana 4. Supineline: Utthitadvipadasana, Ardhahalasana, Halasana **Patanjali's Ashtanga Yoga**: Yama, Niyama **Pranayama:** Suryanuloma –Viloma, Chandranuloma-Viloma	2 Hrs/week
6th	**Suryanamaskara:** Suryanamaskar 12 count,4rounds **Kapalabhati:** Revision of Kapalabhati -60strokes/min3rounds **Different types of Asanas**: 1. Sitting: Paschimottanasana, Ardha Ushtrasana, Vakrasana, Aakarna Dhanurasana 2. Standing: Parshva Chakrasana, Urdhva Hastothanasana, Hastapadasana 3. Prone line: Dhanurasana 4. Supine line: Karna Peedasana, Sarvangasana, Chakraasana **Patanjali's Ashtanga Yoga**: Asana, Pranayama **Pranayama:** Chandra Bhedana, Nadishodhana, Surya Bhedana	
7th	**Suryanamaskara:** Suryanamaskar 12 count,8rounds **Kapalabhati:** Revision of Kapalabhati - 80strokes/min3rounds **Different types of Asanas**: 1. Sitting: Yogamudra in Padmasana, Vibhakta Paschimottanasana, Yogamudra in Vajrasana 2. Standing: Parivritta Trikonasana, Utkatasana, Parshvakonasana 3. Prone line: Padangushtha Dhanurasana, Poorna Bhujangasana / Rajakapotasana 4. Supine line: Navasana/Noukasana, Pavanamuktasana, Sarvangasana **Patanjali's Ashtanga Yoga**: Pratyahara, Dharana **Pranayama:** Ujjayi, Sheetali, Sheektari	
8th	**Suryanamaskara:** Suryanamaskar 12 count,12rounds **Kapalabhati:** Revision of Kapalabhati - 100strokes/min3rounds **Different types of Asanas**: 1. Sitting: Bakasana, Hanumanasana, Ekapada Rajakapotasana 2. Standing: Parivritta Trikonasana, Utkatasana, Parshvakonasana 3. Prone line: Mayurasana 4. Supine line: Setubandhasana, Shavasanaa (Relaxation posture) 5. Balancing: Sheershasana **Patanjali's AshtangaYoga**: Dhyana (Meditation), Samadhi **Pranayama:** Bhastrika, Bhramari, Ujjai **Shat Kriyas:** Jalaneti and sutraneti, Sheetkarma Kapalabhati	

CIE Assessment Pattern (50 Marks – Practical) –

CIE to be evaluated every semester end based on practical demonstration of Yogasana learnt in the semester.

CIE	Marks
5th Semester	10
6th Semester	10
7th Semester	15
8th Semester	15
Total	**50**

SEE Assessment Pattern (50 Marks – Practical)

SEE	Marks
Suryanamaskara	10
Kapalabhati	10
Asanas	10
Patanjali's Ashtanga Yoga	10
Pranayama / Shat Kriyas	10
Total	**50**

Suggested Learning Resources:

Reference Books:

2. Swami Kuvulyananda: Asma (Kavalyadhama, Lonavala)
3. Tiwari, O P: Asana Why and How
4. Ajitkumar: Yoga Pravesha (Kannada)
5. Swami Satyananda Saraswati: Asana Pranayama, Mudra, Bandha (Bihar School of yoga, Munger)
6. Swami Satyananda Saraswati: Surya Namaskar (Bihar School of yoga, Munger)
7. Nagendra H R: The art and science of Pranayama
8. Tiruka: Shatkriyegalu (Kannada)
9. Iyengar B K S: Yoga Pradipika (Kannada)
10. Iyengar B K S: Light on Yoga (English)

APPENDIX A

Assessment Pattern

1. Assignment
2. Group Discussions
3. Case Studies
4. Practical Orientation on Design Thinking , Creativity & Innovation
5. Participatory & Industry-Integrated Learning
6. Practical activities/Problem Solving exercises
7. Class Presentations
8. Analysis of Industry/Technical/Business Reports
9. Reports on Industrial Visits
10. Industrial/Social/Rural Projects
11. Participation in external Seminars/Workshop
12. Online/Offline Quizzes

APPENDIX B

Outcome Based Education

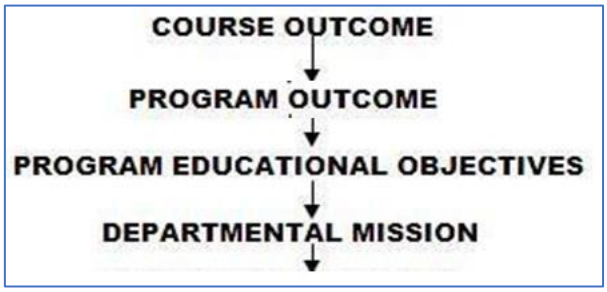
Outcome-based education (OBE) is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience each student should have achieved the goal. There is no specified style of teaching or assessment in OBE; instead classes, opportunities, and assessments should all help students achieve the specified outcomes. There are three educational Outcomes as defined by the National Board of Accreditation:

Program Educational Objectives: The Educational objectives of an engineering degree program are the statements that describe the expected achievements of graduate in their career and also in particular what the graduates are expected to perform and achieve during the first few years after graduation. [nbaindia.org]

Program Outcomes: What the student would demonstrate upon graduation. Graduate attributes are separately listed in Appendix C

Course Outcome: The specific outcome/s of each course/subject that is a part of the program curriculum. Each subject/course is expected to have a set of Course Outcomes

Mapping of Outcomes



APPENDIX C

The Graduate Attributes of NBA

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: The problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions that require consideration of appropriate constraints/requirements not explicitly given in the problem statement (like: cost, power requirement, durability, product life, etc.) which need to be defined (modeled) within appropriate mathematical framework that often require use of modern computational concepts and tools.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

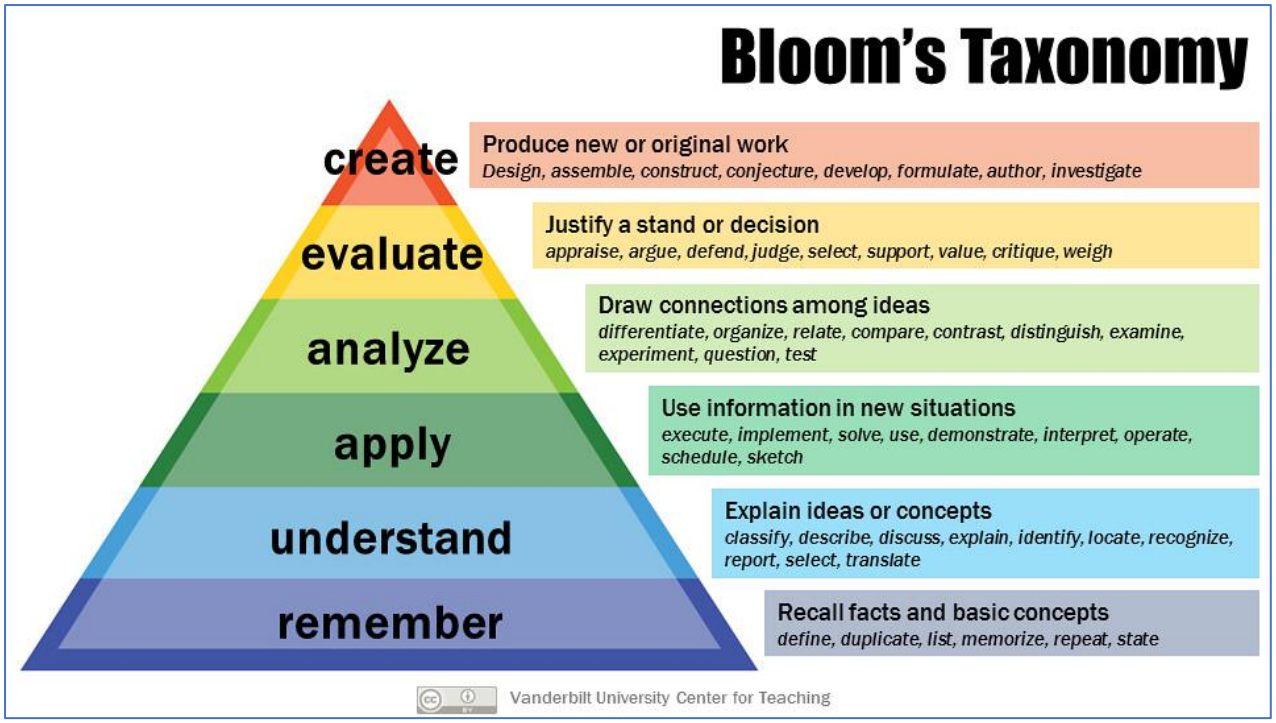
Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

APPENDIX D

BLOOM'S TAXONOMY

Bloom's taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. Educators have typically used Bloom's taxonomy to inform or guide the development of assessments (tests and other evaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.


Bloom's Taxonomy
create
evaluate
analyze
apply
understand
remember
Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate
Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh
Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test
Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch
Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate
Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state
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