NEW HORIZON
COLLEGE OF ENGINEERING

Department of Computer Engineering

Academic Year 2024-25

Scheme & Syllabus

Semester - 7 & 8 | (2021 Scheme)

BATCH: 2021-25

CREDITS: 160 (NEP)

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 the academia and 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.

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 COMPUTER ENGINEERING

VISION

To produce engineers, researchers and technologists with managerial skills of highest competence who would be able to solve the challenges of society.

MISSION

- To impart high quality professional training, practical experience and value education in the Computer Engineering.
- To pursue creative research in Computer Engineering in order to serve the engineering community and society.
- To prepare and encourage a student for Lifelong learning to meet career and ethical challenges through active participation in co-curricular and extracurricular activities.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1:	To prepare globally competent graduates having strong fundamentals of Computer Engineering domain knowledge, updated with modern technology to provide effective solutions for engineering problems.
PEO2:	To acuminate graduates with ability to adapt and develop projects towards the latest technological era of the Computing and IT sector with a high degree of innovative ideas.
PEO3:	To produce committed and motivated graduates with research attitude, investigative approach, and multidisciplinary thinking for implementation of strategic tasks.
PEO4:	To shape the graduates with strong managerial and communication skills to work and learn continuously and effectively as individuals as well as in teams.

PEO TO MISSION STATEMENT MAPPING

Mission Statements	PEO1	PEO2	PEO3	PEO4
To impart high quality professional training, practical experience and value education in the Computer Engineering.	3	2	2	2
To pursue creative research in Computer Engineering in order to serve the engineering community and society.	3	2	2	2
To prepare and encourage a student for Lifelong learning to meet career and ethical challenges through active participation in co-curricular and extracurricular activities.	2	2	3	3

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

PROGRAM OUTCOMES (POS) WITH GRADUATE ATTRIBUTES

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems in Computer Engineering.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex Engineering problems in Computer Engineering reaching substantiated conclusions using first principles of mathematics, natural sciences, and Engineering sciences.
PO3	**Design / Development of Solutions:** Design solutions for complex Engineering problems and design system components or processes of Computer Engineering that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
PO4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments in Computer Engineering, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern Engineering and IT tools including prediction and modeling to complex Engineering activities in Computer Engineering with an understanding of the limitations.
PO6	**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 in Computer Engineering.
PO7	**Environment and Sustainability:** Understand the impact of the professional Engineering solutions of Computer Engineering in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.
PO9	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication Skills:** 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.
PO11	**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.
PO12	**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.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1	The ability to apply the knowledge of core science, engineering mathematics and engineering fundamentals to design and develop the computing systems.
PSO2	The ability to provide effective and efficient real time solutions to problems in computer engineering using acquired knowledge in various domains.

Mapping of POs with PEOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	3	3	2	3	-	-	-	3	-	3	-
PEO2	3	3	3	2	3	-	-	-	3	-	3	-
PEO3	3	3	3	2	3	-	-	-	3	-	3	-
PEO4	3	3	3	2	3	-	-	-	3	-	3	-

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

NEW HORIZON COLLEGE OF ENGINEERING
B. E. in Computer Engineering
Scheme of Teaching and Examinations for 2021- 2025 BATCH (2021 Scheme)

VII Semester

SL. No.	Course and Course Code		Course Title	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
					L	T	P	S			CIE	SEE	Total
1	IPCC	21CEE71	Full Stack Development	CEE	2	0	1	0	3	4	50	50	**100**
2	IPCC	21CEE72	Mobile Application Development	CEE	2	0	1	0	3	4	50	50	**100**
3	PROJ	21CEE73	Project Work	CEE	0	0	12	0	12	0	100	100	**200**
4	AEC	21CEK74	Scientific Foundations of Health	CEE	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**	**12**	**300**	**300**	**600**

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.

IPCC: Integrated Professional Core Course, **OEC**: Open Elective Course, **AEC**: Ability Enhancement 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.

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

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

NEW HORIZON COLLEGE OF ENGINEERING
B. E. in Computer 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	CIE	SEE	Total
					L	T	P	S					
1	PEC	21CEE81X	Professional Elective Course-III	CEE	3	0	0	0	3	3	50	50	**100**
2	SEM	21CEE82	Technical Seminar	CEE	0	0	1	0	1	0	50	-	**50**
3	INT	21CEE83	Research Internship/ Industry Internship /Rural Internship	CEE	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**

PEC: Professional Elective Course, **NCMC:** Non-Credit Mandatory 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			
21CEE811	Data Visualization	21CEE814	Wireless Ad hoc Networks
21CEE812	Social Network Analysis	21CEE815	Blockchain and Its Application
21CEE813	High Performance Computing		

Elucidation

Research/Industry 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 have 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 (21CEE82)

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.

1. Carry out literature survey, systematically organize the content.
2. Prepare the report with own sentences, avoiding a cut and paste act.
3. Type the matter to acquaint with the use of Micro-soft equation and drawing tools or any such facilities.
4. Present the seminar topic through PowerPoint slides.
5. Answer the queries and involve in debate/discussion.
6. 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.

SEMESTER VII (SYLLABUS)

FULL STACK DEVELOPMENT

Course Code	**21CEE71**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs. / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

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

21CEE71.1	Apply mark-up tags with styles to design aesthetic web pages.
21CEE71.2	Illustrate client-side scripting to validate the web pages.
21CEE71.3	Apply server-side scripting for developing dynamic and responsive web applications.
21CEE71.4	Analyze the development of Web Application with database support.
21CEE71.5	Examine development of extensive web applications.
21CEE71.6	Illustrate the databases using MySQL databases.

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
21CEE71.1	1	-	2	-	1	-	-	-	-	-	-	-	3	-
21CEE71.2	-	1	1	-	1	-	-	-	-	-	-	-	3	-
21CEE71.3	-	-	1	-	1	-	-	-	-	-	-	-	3	-
21CEE71.4	-	-	2	-	1	-	-	-	-	-	-	-	3	-
21CEE71.5	-	-	1	-	1	-	-	-	-	-	-	-	3	-
21CEE71.6	-	-	1	-	1	-	-	-	-	-	-	-	3	-

MODULE-1	**INTRODUCTION TO WEB PROGRAMMING AND HTML5**	**21CEE71.1**	**8 Hours**

Introduction to Full Stack Development, HTML Basic Tags - Syntax, Elements, Attributes, Headings, Paragraph, Style, Formatting, Tables, Links, Images, Lists, Forms. Cascading Style Sheets - Syntax, Levels of CSS, Selectors, Properties, Box Model, Span vs Div, flex and grid.

Laboratory Component:

(1) To design a user interface for a given scenario using basic tags, lists, hyperlinks and tables using HTML.
(2) To design responsive web pages for user registration using HTML forms.
(3) To demonstrate the concepts of CSS flex.

Case study	Analyze standard web applications to understand the importance of HTML tags covered in the module
Text Book	Text Book 1: CHAPTER 1, 2, 3

MODULE-2	**SCRIPTING LANGUAGE AND FRAMEWORK**	**21CEE71.2**	**8 Hours**

Overview of Javascript, Basics, Standard Input and Screen Output, Object – Creation & Modification, String Objects, Arrays, Functions, Constructors. Document Object Model - Elements Access in Java Script, Events and Event Handling.

Laboratory Component:

(1) To demonstrate the array manipulation methods in JavaScript.
(2) Create a table at least with 5 rows and 5 columns without using tags (create the element by DOM)
(3) use the JavaScript event (onclick) to change the background colour of a page.

Text Book	Text Book 1: CHAPTER 4, 5, 6

MODULE-3	**BOOTSTRAP AND SERVER-SIDE SCRIPTING**	**21CEE71.3**	**8 Hours**

Introduction, File Structure, Basic HTML Template, Global Styles, Default Grid System — Basic Grid HTML, Offsetting Columns, Nesting Columns, Fluid Grid Systems, Container Layouts, Responsive Design. PHP Framework, Applications, General Syntactic Structure, Primitives, Operations and Expressions. Control Statements, Arrays.

Laboratory Component:

(1) To demonstrate the concepts of various UI components of Bootstrap.
(2) Design a registration form using Bootstrap form classes. Include fields for name, email, and password.
(3) Use a Bootstrap to create 3 rows and 3 columns cards with a button that navigates to another page.

Text Book	Text Book 2: CHAPTER 1, 2, 3

MODULE-4	**INTRODUCTION TO REACT**	**21CEE71.4, 21CEE71.6**	**8 Hours**

MERN STACK – Basic React applications – React Components – React State – Express REST APIs - Modularization and Webpack - Routing with React Router – Server-side rendering.

Laboratory Component:

(1) Use UseState() hook to increment and decrement the value when we click the respective buttons respectively.
(2) How to send the prop from child to parent component in react.
(3) Demonstrate how to pass the props from one component to another.

Case Study	For a standard webpage developed using Node.js application analyze the usage of cookies and session tracking.		
Text Book	Text Book 3: CHAPTER 6, 7, 9, 10, 11		
MODULE-5	**APPLICATION DEVELOPMENT USING NODE JS**	**21CEE71.5**	**8 Hours**

Introduction to Node.js- Installing Node.js - Using Events, Listeners, Timers, and Callbacks in Node.js – Introduction to Mongo DB- Accessing MongoDB from Node.js.

Laboratory Component:

(1) To create a simple HTTP server in Node.js using ExpressJs
(2) To connect a Node.js application to a MongoDB database.
(3) To implement and manage root in a Node.js application**.**

Text Book	Text Book 4: CHAPTER 1, 2, 4, 8, 9, 11, 12

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		**Marks Distribution**		
		Test (s)	**Qualitative Assessment (s)**	**LAB**
		25	05	20
L1	**Remember**	--	--	--
L2	**Understand**	5	--	5
L3	**Apply**	10	5	5
L4	**Analyze**	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. Sebesta, Robert W, Addison-Wesley Professional, “Programming the world wide web”, 8th edition 2014,ISBN: 13-978-0133775983.
2. Jake Spurlock, “Bootstrap”,7th edition 2013, Publisher(s): O'Reilly Media, Inc. ISBN: 9781449344597
3. Greg Sidelnikov, “Learning React JavaScript Library from Scratch” Kindle Edition 2017, ISBN-10-1521546185
4. Basarat Ali Syed, “Beginning Node.js”, Edition 2014, ISBN: 9781484201879

Reference Books:

1. Mark Meyers, “A Smart way to Learn JavaScript”, 2013-14, ISBN-13-978-1497408180 (e-book and Kindle version only).
2. Benjamin la kobus, Jason Mara h, “Mastering Bootstrap4”, Edition 2016, Packet Publishing, ISBN-10-1783981121.
3. Chris Bates, “Web Programming”, Wiley Publications HTML5 Black Book by Dreamtech, Edition 2007, ISBN-10 9788126512904.

Web links and Video Lectures (e-Resources)

- https://www.youtube.com/watch?v=3Xly2W1Cisc
- Https://www.youtube.com/watch?v=OK_JCtrrv-c
- https://html-iitd.vlabs.ac.in/exp/introduction-to-html/references.html

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

- Analyze existing web sites in groups to understand the usage of various full stack development tools. Contests on web page designing and development.

MOBILE APPLICATION DEVELOPMENT

Course Code	**21CEE72**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

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

21CEE72.1	Understand the Components and Structure of mobile application development frameworks for Android based mobiles.
21CEE72.2	Understand how to work with various mobile application development frameworks.
21CEE72.3	Apply the basic and important design concepts and issues of development of mobile applications.
21CEE72.4	Analyze the capabilities and limitations of mobile devices.
21CEE72.5	Develop the skills in designing and building mobile applications using the android platform.
21CEE72.6	Build 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
21CEE72.1	3	3	3	-	-	-	-	-	-	-	-	1	2	2
21CEE72.2	3	3	3	-	-	-	-	-	-	-	-	1	2	2
21CEE72.3	3	3	3	-	-	-	-	-	-	-	-	1	2	2
21CEE72.4	3	3	3	-	-	-	-	-	-	-	-	1	2	2
21CEE72.5	3	3	3	-	-	-	-	-	-	-	-	1	2	2
21CEE72.6	3	3	3	-	-	-	-	-	-	-	-	1	2	2

MODULE-1	**INTRODUCTION TO ANDROID OPERATING SYSTEM:**	**21CEE72.1**	**8 HOURS**

Android OS design and Features – Android development framework, SDK features, Installing and running applications on Eclipse platform, 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

Laboratory Component:

(1) Installation of Android studio.
(2) Development Of Hello World Application
(3) Design and implement a single screen app that displays information about a small business. e.g. Restaurant, Book shop etc. Your design must include:
- Business name
- Photo of business
- Contact information

Case Study	Study case studies of successful Android app projects, understanding the challenges faced, solutions implemented, and the overall development process.
Text Book	Text book 1: Chapter 1, 2 and 3

MODULE-2	**ANDROID UI ARCHITECTURE & UI WIDGETS**	**21CEE72.2**	**8 HOURS**

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

Laboratory Component:

(1) Create an application that takes the name from a text box and shows a hello message along with the name entered in the text box, when the user clicks the OK button.
(2) Design and develop a Mobile App for smart phones The Easy Unit Converter using Android.
(3) Develop an Android application using controls like Button, Text View, Edit Text for designing a calculator having basic functionality like Addition, Subtraction, Multiplication, and Division.

Case Study	Explore case studies of design patterns commonly used in Android UI development, such as Model-View-Controller (MVC), Model-View-Presenter (MVP), and Model-View-View-Model (MVVM)
Text Book	Text book 1: Chapter 4

MODULE-3	**INTENTS AND BROADCASTS**	**21CEE72.3, 21CEE72.5**	**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

Laboratory Component:

(1) Design an android application to send data from one Activity to second Activity using intent
(2) Design an android application Send SMS using Intent
(3) Design an android application to perform common actions like opening web pages, sending emails, and viewing locations.

Case Study	Explore case studies of Android apps that utilize intents and broadcasts effectively.		
Text Book	Text book 1: Chapter 5		
MODULE-4	**DATA STORAGE, SERVICES & CONTENT PROVIDERS**	**21CEE72.4**	**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.

Laboratory Component:

(1) Design and develop a Mobile App for smart phones The Expense Manager using Android. The application should store all the expenses in a file
(2) Design and develop Health Monitoring App using Android. The app will store the blood pressure, blood group and glucose level of patient in SQLite database
(3) Create a user registration application that stores the user details in a database table.

Self-Study	Learn how content providers facilitate data sharing between apps and provide a standard interface for accessing data stored in databases or other sources.		
Text Book	Text book 1: Chapter 6 and 7		
MODULE-5	**ADVANCED APPLICATIONS**	**21CEE72.6**	**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.

Laboratory Component:

(1) Develop an android app to display Map of your college locality
(2) Develop an android app to alert SMS to one given phone number
(3) Design an android app play music in background

Self-Study	Study Android's graphics rendering pipeline, including OpenGL ES for 3D graphics and the Canvas and Paint classes for 2D graphics
Text Book	Text book 1: Chapter 8, 11, 13 and 14

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		**Marks Distribution**		
		Test (s)	**Qualitative Assessment (s)**	**LAB**
		25	05	20
L1	**Remember**	5	-	-
L2	**Understand**	5	-	-
L3	**Apply**	5	5	5
L4	**Analyze**	5		5
L5	**Evaluate**	5	-	10
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. Reto Meier, "Professional Android2 Application Development", Wiley India Pvt. ltd, 1st Edition;2012, ISBN-13: 978-0470565520, ISBN-10: 0470565527.

Reference Books:

1. Mark Murphy, "BeginningAndroid3", A press Springer India Pvt Ltd, 1st Edition; 2011, ISBN-10: 1430232978, ISBN-13 : 978-1430232971
2. Eric Hellman, "Android Programming–Pushing the limits", Wiley, 1st Edition, 2013, ISBN-13:978-1118717370

3. Wei-Meng Lee, “Beginning Android 4 Application Development”, Wiley India (Wrox), 2013, ISBN-10 : 8126535571, ISBN-13 : 978-8126535576
4. 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)
5. Phillips, Stewart, Hardy and Marsicano, “Android Programming”, 2nd edition -Big Nerd Ranch Guide;2015 ISBN: 0134171454
6. James C Sheusi, “Android Application Development for Java Programmers”, Cengage Learning, 1st Edition, 2013, ISBN-10: 8131519031, ISBN-13: 978-8131519035

Web links and Video Lectures (e-Resources)

- https://developer.android.com/studio/intro
- https://www.tutorialspoint.com/android/index.htm
- https://www.javatpoint.com/android-tutorial

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

- Create a simple user interface (UI) for a mobile app using drag-and-drop tools or code.
- Implement interactive elements such as buttons with click events and text fields with input validation.
- Add multimedia elements such as images, audio, or video to your app.
- Incorporate location-based features like displaying the user's current location on a map.

PROJECT WORK			
Course Code	**21CEE73**	**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:

21CEE73.1	Identify societal problems under sustainable development goals and classify them underdifferent domains of computer science and engineering with interdisciplinary perspective.
21CEE73.2	Demonstrate the ability to conduct comprehensive literature reviews using appropriate research databases, search strategies, and citation management tools to identify relevant sources of information.
21CEE73.3	Apply knowledge of relevant programming languages, software and hardware development methodologies, tools, and technologies to address projectrequirements effectively.
21CEE73.4	Design the models for the proposed system.
21CEE73.5	Organize the article logically, following a structured format with well-defined sections such asintroduction, background, methodology, results, discussion, and conclusion.
21CEE73.6	Demonstrate their communication skill effectively with the technical presentation.

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
21CEE73.1	3	2	1	-	-	3	2	-	3	2	2	2	-	2
21CEE73.2	3	3	2	-	-	2	2	3	3	1	-	2	-	2
21CEE73.3	3	3	3	3	3	2	1	2	3	3	2	3	2	2
21CEE73.4	3	3	3	2	2	-	-	-	3	3	-	2	2	2
21CEE73.5	3	3	3	2	2	-	-	-	3	3	2	2	2	2
21CEE73.6	3	3	2	-	-	2	-	3	3	1	2	2	-	2

Project Work: Roadmap, activities, and deliverables

Goal Selection and Project Planning:

- Identification of suitable topic based on Sustainable Development Goals.
- Forming project teams based on common interests and skill sets.
- Teams' involvement in developing project proposals outlining objectives, strategies, and expectedoutcomes.

Research and Needs Assessment:

- Survey conduction by thorough research on the chosen SDGs, including global and local context,challenges, and opportunities.
- Conduct needs assessments to identify specific issues or gaps that student projects can address

Interdisciplinary approaches:

- Applying interdisciplinary approaches and innovative solutions to tackle sustainability challenges.

Deployment:

- Deploy the project on appropriate hardware and software environments, considering scalability,security, and performance requirements.
- Configure servers, databases, and other infrastructure components to support the application'soperation.
- Conduct deployment testing to ensure a smooth transition from development to production.

Knowledge Sharing and Communication:

- students to share their project experiences and insights through presentations, reports, and socialmedia.
- Foster peer-to-peer learning and collaboration by creating platforms for knowledge

CIE Assessment Pattern (100 Marks)

RBT Levels		CIE MARKS DISTRIBUTION (100)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	20
L5	Evaluate	20
L6	Create	20

SEE Assessment Pattern (100 Marks)

RBT Levels		Exam Marks Distribution (100)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	20
L5	Evaluate	20
L6	Create	20

SCIENTIFIC FOUNDATIONS OF HEALTH			
Course Code	**21CEK74**	**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:

21CEK74.1	Understand the concepts of Health and wellness and the importance of achieving balanced good health
21CEK74.2	Implement healthy lifestyle habits effectively to enhance overall well-being
21CEK74.3	Adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus
21CEK74.4	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
21CEK74.1	-	-	-	-	-	1	-	-	-	-	-	-
21CEK74.2	-	-	-	-	-	1	-	-	-	-	-	-
21CEK74.3	-	-	-	-	-	2	-	-	-	-	-	-
21CEK74.4	-	-	-	-	-	3	-	-	-	-	-	-

MODULE-1	**GOOD HEALTH AND IT'S BALANCE FOR POSITIVE MINDSET**	**21CEK74.1**	**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: Chapter 1

MODULE-2	**BUILDING OF HEALTHY LIFESTYLES FOR BETTER FUTURE**	**21CEK74.2**	**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: Chapter 2, Text Book 3: Chapter 7

MODULE-3	**CREATION OF HEALTHY AND CARING RELATIONSHIPS**	**21CEK74.1, 21CEK74.2**	**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: Chapter 3

MODULE-4	**AVOIDING RISKS AND HARMFUL HABITS**	**21CEK74.3**	**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: Chapter 4, Text Book 3: Chapter 5,6

MODULE-5	**PREVENTING AND FIGHTING AGAINST DISEASES FOR GOOD HEALTH**	**21CEK74.4**	**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: Chapter 5, Text Book 2: Chapter 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

SEMESTER VIII (SYLLABUS)

DATA VISUALIZATION

Course Code	**21CEE811**	**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

21CEE811.1	Estimate the dimensions of data visualization and dashboards
21CEE811.2	Examine the Concept of data visualization using Tableau
21CEE811.3	Identify different ways to create a tableau for given data.
21CEE811.4	Analyze the high value insights with the help of pandas and seaborn
21CEE811.5	Derive the data on the given desktop tableau platform Audience analysis for storytelling
21CEE811.6	Design visualization for digital presentation

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
21CEE811.1	2	3	2	2	2	2	2	-	-	-	-	2	-	2
21CEE811.2	2	2	3	2	-	2	2	-	-	-	-	2	2	2
21CEE811.3	2	2	2	2	2	2	-	-	-	-	-	2	2	3
21CEE811.4	3	-	2	3	2	2	2	-	-	-	-	2	2	2
21CEE811.5	2	2	2	2	2	2	2	-	-	-	-	2	2	2
21CEE811.6	2	2	2	-	2	2	2	-	-	-	-	2	2	2

MODULE-1	**INTRODUCTION – DATA VISUALISATION**	**21CEE811.1**	**08 Hours**

Data visualization: Introduction, Types of data visualization. Data types, Data encodings, Retinal variables, mapping variables to encodings, Visual encodings. Fundamentals of visualization. Introduction to visualization tool (Tableau), data ingestion, working with visualization tool, dashboarding. Frequency distributions, histograms, stem-and-leaf displays, bar charts, pie charts, and scatter plots. Advanced Plots and charts types (stacked bar chart, area chart, bubble chart, box plot, Venn diagram, tree map).

The matplotlib package: setting graph attributes. saving plots to files, plot configuration files, plotting with pandas and seaborn. Integrating with other Visualization tools.

Self-study	Pandas and data, types, encoding
Text Book	Text Book 1: Chapter 4

MODULE-2	**DATA VISUALISATION USING TABLEAU**	**21CEE811.2**	**08 Hours**

Purpose of data visualization, guiding principles - Good & Bad representation. Use of color & scales, Types of charts, relevant use of charts for various scenarios. Creating a plot, Histograms, Line charts, Bar charts, Pie charts, Box plots, Scatter plots.

Tableau Environment: Start Page – Data source page – Tableau workspace – Side bar – Shelves and cards – Parts of the view –Workbooks and sheets – Files and Folders – Status Bar- Tooltips – Reorganize your workspace – Language and locale.

Self-study	Tableau Workspace
Text Book	Text Book 1: Chapter 6

MODULE-3	**INTRODUCTION – STORY TELLING**	**21CEE811.3**	**08 Hours**

Overview-Storytelling in a digital era – Visualization to Visual Data Storytelling: An Evolution – Science of storytelling – Power of Stories – Exploratory Vs explanatory analysis – Story plot, Story Genre – Audience analysis for storytelling – who, what, why, how.

Self-study	Analysis storytelling
Text Book	Text Book 1: Chapter 9

MODULE-4	**PREPARING DATA FOR STORY TELLING**	**21CEE811.4**	**08 Hours**

Getting started with Tableau – Tableau Server, Tableau Desktop, Tableau Online, Tableau Public – Connecting to data.

Self-study	Applications of storytelling
Text Book	Text Book 1: Chapter 9

MODULE-5	**CURATING VISUALS FOR AUDIENCE**	**21CEE811.5, 21CEE811.6**	**08 Hours**

Visual design building blocks – Stepped color and reversed color – Color effects – Opacity, mark borders, mark halos – Formatting grid lines, zero lines, drop lines, and boarders – Formatting, shading, and banding – Shape marks card and custom shapes – Case study: color consideration with a dark background Effective Dashboard Design and Digital Presentation Dashboards- best practices for effective dashboards – create a dashboard- create dashboard device layouts – refine dashboard – tiled and floating layouts – stories – story workspace – create a story – customize a story point-

format, update, present story - understanding stories in tableau	
Applications	Creation of dashboard visualization.
Text Book	Text Book 1: Chapter 8

CIE Assessment Pattern (50 Marks – Theory)

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

SEE Assessment Pattern (50 Marks – Theory)

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

Suggested Learning Resources:

Text Books:

(1) "Visual Data Storytelling with Tableau", Ryan, Lindy, Pearson Addison Wesley Data and Analytics Series, Addison-Wesley Professional, 1st Edition, 2018, ISBN-10: 0134712838.

Reference Books:

(1) Knaflic, Cole Nussbaumer, "Storytelling with Data: A data visualization guide for business professions", Wiley publication, 1st Edition 2015, ISBN-10: 1119002257

(2) Sharada Sringeswara; Purvi Tiwari; U. Dinesh Kumar, "Data Visualization: Storytelling using Data", - Wiley Publication (2020), ISBN-10: 9354643132.

Web links and Video Lectures (e-Resources)

- https://www.youtube.com/watch?v=_qReGTOrKTk
- https://www.youtube.com/watch?v=sWWLMb1Dcy4
- https://www.youtube.com/watch?v=-bSkREem8dM

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

- Demonstration of creating charts and boxplots
- Demonstration of story plots and workspace
- Video demonstration of latest trends in tableau
- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare exploratory tableau.
  - Organizing Group wise discussions on issues in the data visualization dashboard.
- Seminars on data science

SOCIAL NETWORK ANALYSIS			
Course Code	**21CEE812**	**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

21CEE812.1	Understand the foundational concepts and history of social network analysis, including network theory, sociometry, and the entry of social physicists in the field**.**
21CEE812.2	Analyze social networks using sociograms and matrices, identifying cliques and communities within the network.
21CEE812.3	Examine the dynamics of balance and group interactions within social networks, and explore the concepts of informal organization and community relations.
21CEE812.4	Apply formal models of community and kinship to analyze social networks, and recognize the role of formal methods in social network analysis
21CEE812.5	Apply data collection techniques for social network analysis, including observation, document analysis, and using computer programs for network analysis.
21CEE812.6	Apply precise data analysis techniques to tackle real-world challenges.

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
21CEE812.1	2	-	-	-	-	-	-	-	-	-	-	2	3	-
21CEE812.2	3	-	-	-	-	-	-	-	-	-	-	2	3	-
21CEE812.3	3	3	-	-	-	-	-		-	-	-	2	3	-
21CEE812.4	3	3	3	-	-	-	-	-	-	-	-	2	3	-
21CEE812.5	3	3	3	3	2	-	-	-	-	-	-	2	3	-
21CEE812.6	3	3	-	-	3	-	-	-	-	-	-	3	3	-

MODULE-1	**SOCIAL NETWORKING ESSENTIALS**	**21CEE812.1**	**8 Hours**

Understand What Social Networking is, Social Media Characteristics, what is social media and Why It is Important, Types of social media, Core Values, Challenges, Advantages and Disadvantages, Future of Social Networking, Various social networking sites-FACEBOOK, INSTAGRAM, TWITTER, LINKEDIN - Why and how they matter, Key Features, Marketing - What You Need to Know.

Case Study	Select a popular social networking site (e.g., Facebook, Instagram, Twitter) and conduct an analysis of its core features, advantages, and disadvantages.
Text Book	Text Book1: Chapter 1,2

MODULE-2	**GRAPHICAL REPRESENTATION AND NETWORK ANALYSIS FUNDAMENTALS**	**21CEE812.2**	**8 Hours**

Networks as Graphs – Actors, Ties, Networks, Multiplex Networks, Weighted Ties, Group, Geodesic Distance, Graph Connectivity, Degree of an Actor –Indegree and Out degree, Types of nodes– Carrier, Transmitter, Receiver, Isolate, Representation of Social Network Data – Socio matrix and Edge List, Matrix Permutation and Blocks, Network Relationships & Reciprocity, Transitivity, Popularity Structural Equivalence, Clique, Star

Case Study	Analyzing Social Networks in a Corporate Environment.
Text Book	Text Book1: Chapter 4

MODULE-3	**NETWORK STRUCTURES AND SOCIAL DYNAMICS ANALYSIS**	**21CEE812.3**	**8 Hours**

The language of network analysis, joining up the lines, The flow of information and resources, Density of connections, Density in egonets, Problems in density measures, Popularity, Mediation and Exclusion, Local and overall centrality, Mediation and betweenness, Centrality boosts centrality, Centralization and graph centers, The absolute center of a graph, Bank centrality in corporate networks

Case Study	Analyze Social Dynamics in a Student Club Network - To analyze the social dynamics within a student club network, identify the key influencers and understand the flow of information and interactions.
Text Book	Text Book1: Chapter 5, 6

MODULE-4	**NETWORK ANALYSIS METRICS**	**21CEE812.4**	**8 Hours**

Network Density, Properties of Nodes–Degree Centrality, Closeness Centrality, Betweenness Centrality, Centrality of a Network - Network Degree Centrality, Network Closeness Centrality, Network Betweenness Centrality, Page rank centrality.

Case Study	Social Network Analysis of a Company's Employees
Text Book	Text Book1: Chapter 6

MODULE-5	**SOCIAL MEDIA ANALYSIS**	**21CEE812.5, 21CEE812.6**	**8 Hours**

Structural change and unintended consequences, Small-world networks, modelling social change, testing explanations,

Visualizing and Modelling, taking space seriously, Using multi-dimensional scaling, Principal components and factors, non-metric methods, how many dimensions, Worth a thousand words, Elites, communities and influence, Business elites and bank power.

Case Study	Social Media Analysis for Marketing Strategy
Text Book	Text Book1: Chapter 7, 8

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		**Marks Distribution**		
		Test (s)	**Qualitative Assessment (s)**	**MCQ's**
		25	**15**	**10**
L1	**Remember**	5	-	5
L2	**Understand**	5	-	5
L3	**Apply**	10	5	
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 Ganis & Avinash Kohirkar, "Social Media Analytics", Pearson, 2015, ISBN: 9780133892949.
2. John Scott-Social Networks Analysis, 2017, ISBN: 9780133892949.

Reference Books:

1. Guandong Xu , Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition, Springer, 2011, ISBN-13: 978-1446209042.
2. James M Cook, University of Maine at Augusta "What is a Social Network", ISBN-13: 978-0521387071.

Web links and Video Lectures (e-Resources)

- https://archive.nptel.ac.in/courses/106/106/106106239/
- https://www.geeksforgeeks.org/types-of-social-networks-analysis/

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

- Hands on sessions for developing static and dynamic web pages
- Contents related activities (Activity-based discussions)
- For active participation of students, instruct the students in group to Analysis the web pages
- Organizing Group wise discussions on issues.
- Seminars

HIGH PERFORMANCE COMPUTING														
Course Code	**21CEE813**						**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														
21CEE813.1	Understand the overview and analyze the performance metrics of high-performance computing													
21CEE813.2	Design various applications with OpenMP and MPI.													
21CEE813.3	Comprehend the various High Performance Computing Paradigms and Job Management Systems.													
21CEE813.4	Apply high performance computing concepts in problem solving.													
21CEE813.5	Analyze the benchmarks of high-performance computing.													
21CEE813.6	Demonstrate the various emerging trends of high-performance 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**
21CEE813.1	3	3	3	-	-	-	-	-	-	-	-	3	3	3
21CEE813.2	3	2	2	-	-	-	-	-	-	-	-	3	3	3
21CEE813.3	3	3	3	1	-	-	-	-	-	-	-	3	3	3
21CEE813.4	3	2	2	1	-	-	-	-	-	-	-	3	3	3
21CEE813.5	3	3	3	-	-	-	-	-	-	-	-	3	3	3
21CEE813.6	3	3	3	-	-	-	-	-	-	-	-	3	3	3

MODULE-1	**Introduction to High Performance Computing (HPC)**	**21CEE813.1**	**8 Hours**
Overview of Parallel Computers and high-performance computing (HPC), History of HPC, Numerical and HPC libraries, Performance metrics. **HPC Paradigms:** Supercomputing, Cluster Computing, Grid Computing, Cloud Computing, many core Computing, Peta scale Systems			
Case Study	Write a program in C to multiply two matrices of size 10000 x 10000 each and find it's execution-time using "time" command. Try to run this program on two or more machines having different configurations and compare execution-times obtained in each run. Comment on which factors affect the performance of the program Council.		
Text Book	Text Book 2: Chapter 1.2,1.3,1.4,2.1,2.2		
MODULE-2	**Parallel Programming - I**	**21CEE813.2**	**8 Hours**
Introduction to OpenMP, Parallel constructs, Runtime Library routines, Work-sharing constructs, Scheduling clauses, Data environment clauses, atomic, master Nowait Clause, Barrier Construct, overview of MPI, MPI Constructs, OpenMP vs MPI.			
Case Study	OpenMP-parallel Jacobi algorithm		
Text Book	Text Book 1: Chapter 4.1,4.2,5.2,5.3,5.4,6		
MODULE-3	**Job Management Systems**	**21CEE813.3**	**8 Hours**
Batch scheduling: Condor, Slurm, SGE, PBS, Light weight Task Scheduling: Falkon, Sparrow.			
Text Book	Text Book 2: Chapter 3.1,3.2,3.3		
MODULE-4	**Achieving Performance**	**21CEE813.4**	**8 Hours**
Measuring performance, identifying performance bottlenecks, Partitioning applications for heterogeneous resources, Using existing libraries and frameworks.			
Case Study	Parallel Sparse matrix-vector multiply		
Text Book	Text book 1: Chapter 5.1,5.2,5.3,5.7		
MODULE-5	**HPC Benchmarks**	**21CEE813.5, 21CEE813.6**	**8 Hours**
HTC, MTC (Many Tasks Computing), Top 500 Super computers in the world, Top 10 Super Computer architectural details, Exploring HPC Benchmarks: HPL, Stream, Recent Trends.			
Self-study	Artificial Intelligence Will be Used to Improve HPC**.**		
Text Book	Text book 2: Chapter 10.1,10.2,10.3		

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	–	5
L3	Apply	5	5	5
L4	Analyze	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. Georg Hager and Gerhard Wellein, "Introduction to High Performance Computing for Scientists and Engineers" (1st ed.). CRC Press, 2010, ISBN-9780429190612.
2. Victor Eijkhout, Edmond Chow, Robert van de Geijn, "Introduction to High Performance Scientific Computing", 2nd edition, revision 2016, ISBN-101257992546.

Reference Books:

1. Zbigniew J. Czech, "Introduction to parallel computing", 2nd edition, Cambridge University Press, 2016.ISBN-9781107174399.
2. Rob Farber, "CUDA Application Design and Development", Morgan Kaufmann Publishers, 2013. ISBN-0123884322, ISBN-9780123884329.

Web links and Video Lectures (e-Resources)

- https://archive.nptel.ac.in/courses/112/105/112105293/
- https://www.coursera.org/learn/introduction-high-performance-computing

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

- Demonstrate job management techniques and evaluate the performance.
- Demonstrate an application using CUDA.
- Seminars

WIRELESS AD HOC NETWORKS			
Course Code	**21CEE814**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**03**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

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

21CEE814.1	Understand the basics of Ad-hoc & Sensor Networks.
21CEE814.2	Summarize various fundamental and emerging protocols of all layers.
21CEE814.3	Distinguish the various issues pertaining to major obstacles in establishment and efficient management of Ad-hoc and sensor networks.
21CEE814.4	Understand the nature and applications of Ad-hoc and sensor networks.
21CEE814.5	Understand the nature and applications of Ad-hoc and sensor networks.
21CEE814.6	Analyze protocols for Ad Hoc Wireless Networks

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**
21CEE814.1	3	3	3	2	-	-	-	-	-	-	-	2	3	3
21CEE814.2	3	3	3	2	-	-	-	-	-	-	-	2	3	3
21CEE814.3	3	3	3	2	-	-	-	-	-	-	-	2	3	3
21CEE814.4	3	3	3	3	-	-	-	-	-	-	-	2	3	3
21CEE814.5	3	3	3	3	-	-	-	-	-	-	-	2	3	3
21CEE814.6	3	3	3	3	-	-	-	-	-	-	-	2	3	3

MODULE-1	**MAC & TCP IN AD HOC NETWORKS**	**21CEE814.1**	**8 HOURS**

Fundamentals of WLANs, IEEE 802.11 Architecture, Self-configuration and Autoconfiguration Issues in Ad-Hoc Wireless Networks, MAC Protocols for Ad-Hoc Wireless Networks, Contention Based Protocols

Self-study	Investigate the Challenges of TCP protocol overview
Text Book	Text Book 1: Chapter 1,2

MODULE-2	**ROUTING IN AD HOC NETWORKS**	**21CEE814.2**	**8 HOURS**

Routing in Ad-Hoc Networks, Introduction-Topology based versus Position based Approaches, Proactive, Reactive, Hybrid Routing Approach-Principles and issues, Location services, DREAM, Quorums based location service, Grid, forwarding strategies, Greedy packet forwarding, Restricted directional flooding, Hierarchical Routing, Issues and Challenges in providing QoS.

Text Book	Text Book 2: Chapter 4,5,6

MODULE-3	**MAC, ROUTING & QOS IN WIRELESS SENSOR NETWORKS**	**21CEE814.3, 21CEE814.4**	**8 HOURS**

Introduction, Architecture, Single node architecture, Sensor network design considerations, Energy Efficient Design principles for WSNs, Protocols for WSN, Physical Layer, Transceiver Design considerations, MAC Layer Protocols, IEEE 802.15.4 Zigbee, Link Layer and Error Control issues, Routing Protocols, Mobile Nodes and Mobile Robots, Data-Centric & Contention Based Networking, Transport Protocols & QOS, Congestion Control issues, Application Layer support.

Text Book	Text Book 4: Chapter 3,4,5

MODULE-4	**SENSOR MANAGEMENT**	**21CEE814.5**	**8 HOURS**

Sensor Management, Topology Control Protocols and Sensing Mode Selection Protocols, Time synchronization, Localization and positioning, Operating systems and Sensor Network programming, Sensor Network Simulators.

Self-study	Scrutinize the Different types of Sensors for various networking
Text Book	Text Book 4,5,6: Chapter 1,6,7

MODULE-5	**SECURITY IN AD HOC AND SENSOR NETWORKS**	**21CEE814.6**	**8 HOURS**

Security in Ad-Hoc and Sensor Networks, Key Distribution and Management, Software based Anti-tamper techniques, watermarking techniques, Defense against routing attacks, Secure Ad hoc routing protocols, Broadcast authentication WSN protocols, TESLA, Biba – Sensor Network Security Protocols, SPINS.

Text Book	Text Book 3,4,6: Chapter 1,2,6,7,9

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	-	5
L3	Apply	5	5	5
L4	Analyze	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. Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.ISBN: 978-1461349761
2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition), World Scientific Publishing, 2011.ISBN: 9789814360821
3. Erdal Çayırcı , Chunming Rong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009,ISBN: 978-0-470-02748-6
4. Holger Karl, Andreas willig, Protocols and Architectures for Wireless Sensor 59 Networks, John Wiley & Sons, Inc .2005.ISBN:9780470095102
5. Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, "Ad Hoc Mobile Wireless Networks", Auerbach Publications, 2008.ISBN 978-1-4200-6221-2
6. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory and Practice", John Wiley and Sons, 2010.ISBN: 978-0-470-97568-8

Reference Books:

1. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.ISBN 9788131706886
2. C. K. Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.ISBN-13: 978-0130078179

Web links and Video Lectures (e-Resources)

- http://www.ad-hoc-networking-book.com/
- https://www.tutorialspoint.com/wireless_ad_hoc_networks/index.htm
- https://www.geeksforgeeks.org/wireless-ad-hoc-networks/
- https://www.researchgate.net/publication/2565532_Wireless_adhoc_networks_architectures_and_protocols

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

- Demonstration of various commands used in networks.
- Video demonstration of latest trends in networks
- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to work with packet tracer
  - Organizing Group wise discussions on issues in network connectivity
  - Seminars

BLOCKCHAIN AND ITS APPLICATION

Course Code	**21CEE815**	**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

21CEE815.1	Understand the basic concepts of Blockchain**.**
21CEE815.2	Analyze the primitives of cryptography related to block chain.
21CEE815.3	Use Bitcoin Scripting language for secure transactions.
21CEE815.4	Analyze various Ethereum environment and wallets
21CEE815.5	Design smart contracts using solidity
21CEE815.6	Design and develop solutions with Ethereum concepts using any open-source tools

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
21CEE815.1	3	3	-	-	-	-	-	-	-	-	-	3	3	3
21CEE815.2	3	3	3	-	-	-	-	-	-	-	-	3	3	3
21CEE815.3	3	3	3	-	-	-	-	-	-	-	-	3	3	3
21CEE815.4	3	3	3	2	-	-	-	-	-	-	-	3	3	3
21CEE815.5	3	3	3	2	-	-	-	-	-	1	1	3	3	2
21CEE815.6	3	3	3	2	-	-	-	-	-	1	1	3	3	3

MODULE-1	**INTRODUCTION TO BLOCKCHAIN**	**21CEE815.1**	**8 HOURS**

Introduction to Blockchain: The growth of blockchain technology - Progress toward maturity Increasing interest, Distributed systems, The history of blockchain and Bitcoin - The events that led to blockchain, Electronic cash, Blockchain - Blockchain defined, Blockchain architecture, Generic elements of a blockchain, Benefits, features, and limitations of blockchain, Types of blockchain.
Consensus: Consensus mechanism, Types of consensus mechanisms, Consensus in blockchain, CAP theorem and blockchain.

Case Study	Analyze the challenges faced and benefits achieved through the adoption of blockchain technology in the selected area.
Text Book	Text book 1: Chapter 1

MODULE-2	**BLOCK CHAIN CRYPTOGRAPHY**	**21CEE815.2**	**8 HOURS**

Cryptographic primitives: Symmetric cryptography, Stream Ciphers, Block Ciphers, Asymmetric cryptography, Public and private keys, RSA, Elliptical curve cryptography, Hash Functions, Merkle Trees, Digital signature algorithms: RSA and Elliptic curve digital signature algorithms.

Self-study	Cryptographic Challenges in Blockchain
Text Book	Text book 1: Chapter 3 and 4

MODULE-3	**BITCOIN BASICS**	**21CEE815.3**	**8 HOURS**

Bitcoin, Digital keys and addresses, Transactions, Blockchain, proof of work, Proof of stake, Bitcoin Wallets, Bitcoin Payments, Innovation in Bitcoin, Bitcoin Limitations.

Case Study	Compare different types of Bitcoin wallets (e.g., hardware, software, paper wallets). Discuss the security features of each.
Text Book	Text book 1: Chapter 5, 6 and 8

MODULE-4	**ETHEREUM BASICS**	**21CEE815.4, 21CEE815.6**	**8 HOURS**

Fundamentals of Ethereum: History of Ethereum, Ethereum Concepts and Terminology, Ethereum Virtual Machine, Ethereum Releases, Ethereum Networks, Ethereum Wallets, Ethereum currency and units (ether, gwei, wei), Gas, Types of Ethereum Accounts, Ethereum Block chain Explorers, Ether Faucets, Ethereum clients.

Case Study	Transacting between Ethereum accounts, Exploring Ethereum mining and transactions
Text Book	Text book 1: Chapter 9 and 10

MODULE-5	**SMART CONTRACT**	**21CEE815.5**	**8 HOURS**

Smart Contract Programming with Solidity: A smart contract, Lifecycle of Smart Contract, need of smart contracts, Smart contracts in B2C applications (Business to consumer), Smart contracts in B2B applications (Business to business), Solidity Programming: Solidity - Introduction, Need and features, Language: Types, Structures, Control Flow and Smart contract structure. .

Self-study	Applications of Smart Contracts

Text Book	Text book 2: 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	-	5
L2	Understand	5	5	5
L3	Apply	5	5	-
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. Imran Bashir, "Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained", Packt Publishing, 2nd edition, 2018, ISBN-10: 1788839048, ISBN-13: 978-1788839044.
2. Merunas Grincalaitis, "Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-supported Tools, Services, and Protocols", Packt Publishing,2019, ISBN-10 : 1789531373,

Reference Books:

1. Josh Thompson, "Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming", Create Space Independent Publishing Platform, 2017, ISBN-10: 1546772804
2. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction", Princeton University Press, 2016, ISBN-10: 0691171696.

Web links and Video Lectures (e-Resources)

- Blockchain and its Applications - Course (nptel.ac.in)
- Blockchain - Course (swayam2.ac.in)
- Blockchain Theory and Applications I Course by Pohang University of Science and Technology (POSTECH) | Coursera

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

- Creating Ethereum wallets
- Creating Ethereum accounts
- Transacting between Ethereum account
- Interacting with smart contracts
- Writing a basic smart contract Compiling a smart contract Deploying a smart contract
- Debugging smart contract code

TECHNICAL SEMINAR			
Course Code	**21CEE82**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**-**
Hrs / Week	**-**	**Total Marks**	**50**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

21CEE82.1	Recognize recent developments in specific program and in multidisciplinary fields.
21CEE82.2	Summarize the recent technologies and inculcate the skills for literature survey.
21CEE82.3	Demonstrate good presentation skills.
21CEE82.4	Plan and improve the Technical Report writing skills.

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
21CEE82.1	2	2	1	1	2	1	1	2	2	3	1	3	2	2
21CEE82.2	2	2	1	1	2	-	-	2	-	3	-	3	2	2
21CEE82.3	2	1	-	-	-	-	-	-	-	3	-	3	2	2
21CEE82.4	2	1	-	-	-	-	-	-	-	3	-	3	2	2

Course objectives:

- The objective of the seminar is to inculcate self-learning, face audience confidently, enhance communication skill, involve in group discussion and present and exchange ideas.
- Each student, under the guidance of a Faculty, shall choose, preferably, a recent topic of his/her interestrelevant to the Course of Specialization.
- Carry out literature survey, organize the seminar content in a systematic manner.Prepare the report with own sentences, avoiding cut and paste act.
- Type the matter to acquaint with the use of Micro-soft equation and drawing tools or any such facilities.Present the seminar topic orally and/or through power point slides.
- Answer the queries and involve in debate/discussion.Submit typed report with a list of references.
- The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Evaluation Procedure:

The 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.

CIE Assessment Pattern (50 Marks)

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

RESEARCH INTERNSHIP/ INDUSTRY INTERNSHIP /RURAL INTERNSHIP			
Course Code	**21CEE83**	**CIE Marks**	**100**
L:T:P:S	**0:0:12:0**	**SEE Marks**	**100**
Hrs / Week	**-**	**Total Marks**	**200**
Credits	**12**	**Exam Hours**	**03**

Course outcomes:

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

21CEE83.1	Apply appropriate workplace behaviors in a professional setting.
21CEE83.2	Demonstrate content knowledge appropriate to job assignment.
21CEE83.3	Exhibit evidence of increased content knowledge gained through practical experience.
21CEE83.4	Analyze the nature and function of the organization in which the internship experience takesplace.
21CEE83.5	Interpret how the internship placement site fits into their broader career field.
21CEE83.6	Evaluate the internship experience in terms of their personal, educational and career needs.

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
21CEE83.1	3	3	3	3	3	-	-	-	3	-	-	3	2	2
21CEE83.2	3	3	3	3	3	-	-	-	3	-	-	3	2	2
21CEE83.3	3	3	3	3	3	-	-	-	3	-	-	3	2	2
21CEE83.4	3	3	3	3	3	-	-	-	3	-	-	3	2	2
21CEE83.5	3	3	3	3	3	-	-	-	3	-	-	3	2	2
21CEE83.6	3	3	3	3	3	-	-	-	3	-	-	3	2	2

Research internship Outcomes

- Generating technical paper/s and publishing in refereed journal/s.
- Possibility of acquiring intellectual ownership and patent.
- Build a prototype for an idea on which the research was carried out.
- File patent/s.
- Add academic knowledge to the field.
- Enhanced ability in arranging meetings, presentations, seminars, trainings, etc.
- Improved conscientiousness and ethics

Industrial Internships Outcomes

- To bridge a gap between the theoretical knowledge obtained in the classrooms and the practical skillsrequired in the actual workplace.
- Understanding of the analytical concepts and tools, hone their skills in the real-life situations and build confidence in applying the skills learned.
- Have ample opportunities to attend seminars, symposiums, workshops, etc. This in turn provides an opportunity to establish rapports with professionals and pioneers in their respective fields for furthergrowth.
- Have wide scope to publish paper/s in journals and also helps to acquire team spirit, motivated acts, techniques to resolve conflicts, develop a lot of leadership skills etc.

- Increases the prospect of placement in the same concern, provided the intern has exhibited a clear understanding of basics and successfully completed the internship.
- Fosters to substantiate the issues with facts and figures.

Rural Internships Outcomes

- Enhanced Understanding: Deeper understanding of rural issues and Insight into socio-economic dynamics of rural communities.
- Skill Enhancement: Improved communication, leadership, and project management skills and Practicalknowledge in agriculture, education, and healthcare.

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 sustainabledevelopment.
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** ❖ ONE NSS-CAMP @College/University/State or Central Govt Level/ NGO's/General Social Camps **PART B** ❖ Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing ❖ Waste management-Public, Private and Govtorganization,5R's. ❖ Setting of the information imparting club for women leading to contribution in social and economic issues. ❖ Water conservation techniques-Role of different stakeholders-Implementation. ❖ Preparing an actionable business proposal for enhancing the village income and approach for implementation. ❖ Helping local schools to achieve good results and enhance their enrolment in Higher/technical/vocational education. ❖ Developing Sustainable Water management system for rural areas and implementation approaches.	Total 32 Hrs / Semester 2 Hrs /week
	❖ 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. ❖ Spreading public awareness under rural outreach programs. (minimum5programs). ❖ Organize National integration and social harmony events/workshops / Seminars. (Minimum02programs). ❖ Govt. school Rejuvenation and helping them to achieve good infrastructure.	

CIE Assessment Pattern (50 Marks – Practical) –
PART A: Compulsorily students have to attend one camp.
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.
CIE will be evaluated based on their presentation, approach and implementation strategies.

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**: **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. ❖ Jumps- Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing ❖ 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 ❖ 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. ❖ Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques. ❖ Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defense. ❖ Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of the officials. **Kho-Kho:** A. Fundamental skills ❖ 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. ❖ Skills in running: Chain Play, Ring play and Chain & Ring mixed play. ❖ 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**: A. Track -110 Mtrs and 400Mtrs: B. Hurdling Technique: Lead leg Technique, Trail leg Technique, Side Hurdling, Over the Hurdles C. Crouch start (its variations) use of Starting Block. D. Approach to First Hurdles, In Between Hurdles, Last Hurdles to Finishing. E. Jumps- High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing. F. Throws- Discus Throw: Holding the Discus, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle). **Volleyball OR Throw Ball** **Volleyball:** G. A. Fundamental skills H. Service: Under arm service, Side arm service, Tennis service, Floating service. I. Pass: Under arm pass, Over-head pass. J. Spiking and Blocking. K. Game practice with application of Rules and Regulations L. Rules and their interpretation and duties of officials. **Throw Ball:** M.A. Fundamental skills: N. Over hand service, Side arm service, two hand catching, one hand over head return, side arm return. O. B. Rules and their interpretations and duties of officials **Football OR Hockey** **Football:** A. Fundamental Skills P. 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. Q. Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot. R. Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot. S. Heading: In standing, running and jumping condition. T. Throw-in: Standing throw-in and Running throw-in. U. Feinting: With the lower limb and upper part of the body. V. Tackling: Simple Tackling, Slide Tackling. W. Goal Keeping: Collection of Ball, Ball clearance-kicking, throwing and deflecting. X. Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials. **Hockey:** A. Fundamental Skills Y. Passing: Short pass, Long pass, push pass, hit Trapping. Z. Dribbling and Dozing AA. Penalty stroke practice. BB. Penalty corner practice. CC. Tackling: Simple Tackling, Slide Tackling. DD. Goal Keeping, Ball clearance- kicking, and deflecting. EE. Game practice with application of Rules and Regulations. FF. B. Rules and their interpretation and duties of officials.	

7th	**Athletics**: ❖ 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. ❖ Jumps- Triple Jump: Approach Run, Take-off, Flight in the Hop, Step, Jump and Landing ❖ Throws- Javelin Throw: Grip, Carry, and Recovery (3/5 Impulse stride). Release **Cricket OR Baseball** **Cricket:** A. Fundamental skills ❖ Batting- Forward Defense Stroke, Backward Defense Stroke, Off Drive, On Drive, Straight Drive, Cover Drive, Square Cut. ❖ Bowling-Out-swing, In-swing Off Break, Leg Break and Googly. ❖ 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. ❖ Wicket Keeping B. Rules and their interpretation and duties of officials. **Baseball:** A. Fundamental skills: ❖ Player Stances - walking, extending walking, L stance, cat stance Grip - standard grip,choke grip ❖ Batting - swing and bunt. ❖ Pitching ❖ 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 ❖ Passing: Two hand Chest Pass, Two hands Bounce Pass, One hand Baseball Pass, Side arm Pass, Overhead Pass, Hook Pass. ❖ Receiving: Two hand receiving, One hand receiving, Receiving in stationary position, Receiving while Jumping and Receiving while Running. ❖ Dribbling: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble. ❖ Shooting: Lay-up shot and its variations, One hand set shot, Two hands jump shot, Hook shot, Free Throw. ❖ Rebounding: Defensive rebound and Offensive rebound. ❖ Individual Defense: Guarding the player with the ball and without the ball, Pivoting. B. Game practice with application of Rules and Regulations. **Netball:** A. Fundamental Skills ❖ Catching: one handed, two handed, with feet grounded and in flight. ❖ Throwing (Different passes and their uses): One hand passes (shoulder, high shoulder, underarm, bounce, lob), two hand passes (Push, overhead and bounce). ❖ Footwork: Landing on one foot, landing on two feet, Pivot, Running pass. ❖ Shooting: One hand, forward step shot, and backward step shot. ❖ Techniques of free dodge and sprint, sudden sprint, sprint and stop, sprinting with change at speed. ❖ Defending: Marking the player, marking the ball, blocking, inside the circle, outside the circle. Defending the circle edge against the passing. ❖ Intercepting: Pass and shot. ❖ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	

8th	**Athletics**: ❖ Track -Combined Events: o Heptathlon all the 7 events o Decathlon: All 10 Events ❖ Jumps- Pole Vault: Approach Run, Planting the Pole, Take-off, Bar Clearance and Landing. ❖ 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 ❖ Basic Knowledge: Various parts of the Racket and Grip. ❖ Service: Short service, Long service, Long-high service. ❖ Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash. ❖ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials. **Table Tennis:** A. Fundamental skills: ❖ Basic Knowledge: Various parts of the Racket and Grip (Shake Hand &Pen HoldGrip). ❖ Stance: Alternate & Parallel. ❖ Push and Service: Backhand &Forehand. ❖ Chop: Backhand & Forehand. ❖ Receive: Push and Chop with both Backhand & Forehand. ❖ 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 ❖ Catching, Throwing and Ball control, ❖ Goal Throws: Jump shot, Centershot, Dive shot, Reverse shot. ❖ Dribbling: High and low. ❖ Attack and counter attack, simple counter attack, counter attack from two wingsand center. ❖ Blocking, Goal Keeping and Defensive skills. ❖ Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of officials **Ball badminton:** A. Fundamental Skills ❖ Basic Knowledge: Various parts of the Racket and Grip. ❖ Service: Short service, long service, Long-high service. ❖ Shots: Overhead shot, Defensive clear shot, attacking clear shot, Drop shot,Net shot, Smash. ❖ Game practice with application of Rules and Regulations. 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, New Delhi.
5. Jain,R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi.
6. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New Delhi.
7. Saha, A.K.Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
8. Bandopadhyay,K. Sarir Siksha Parichay, Classic Publishers, Kolkata
9. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
10. Dubey,H.C. Basketball, Discovery Publishing House, New Delhi.
11. RachanaJain, Teach Yourself Basketball, Sports Publication.
12. JackNagle, Power Pattern Offences for Winning basketball, Parker Publishing Co., New York.
13. RenuJain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
14. SallyKus, Coaching Volleyball Successfully, Human Kinetics.
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 ofyoga, importance of prayer **Brief introduction of yogic practices for common man:** Yogic practices forcommon man to promote positive health **Rules and regulations:** Rules to be followed during yogic practices bypractitioner **Misconceptions of yoga:** Yoga its misconceptions, Difference between yogicand non-yogic practices. **Suryanamaskara:** 1. Suryanamaskar prayer and its meaning, Need, importance and benefits of Suryanamaskar. 2. Suryanamaskar 12 count,2rounds **Kapalabhati:** Meaning, importance and benefits of Kapalabhati - 40strokes/min3rounds **Different types of Asanas**: 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	Total 32 Hrs/ Semester 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, AakarnaDhanurasana 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) –
to be evaluated every semester end based on practical demonstration of Yogasana learnt in thesemester.

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:

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

APPENDIX A

LIST OF ASSESSMENT PATTERNS

1. Assignments (Individual and/ or Group)
2. Group Discussions
3. Case Studies / Case Lets
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. Any other Academic Activity
13. Online / Offline Quizzes

APPENDIX B

OUTCOME BASED EDUCATION

Outcome-based education (OBE) is an educational theory that bases each part of and 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.

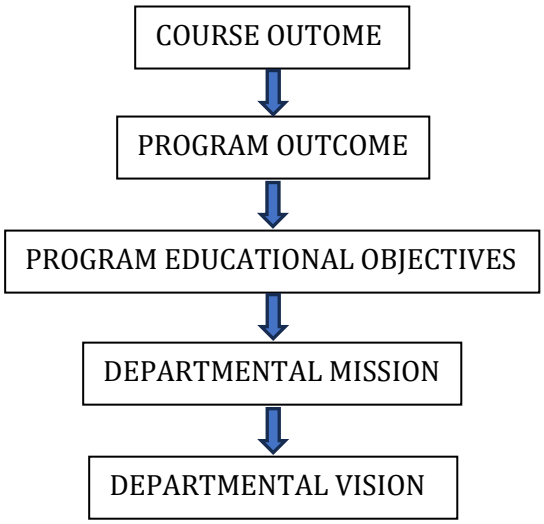
There are three educational Outcomes as defined by the National Board of Accreditation:

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 attributesare 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 manyways 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 withan 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 theprofessional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutionsin 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 reportsand design documentation, make effective presentations, and give and receive clear instructions.

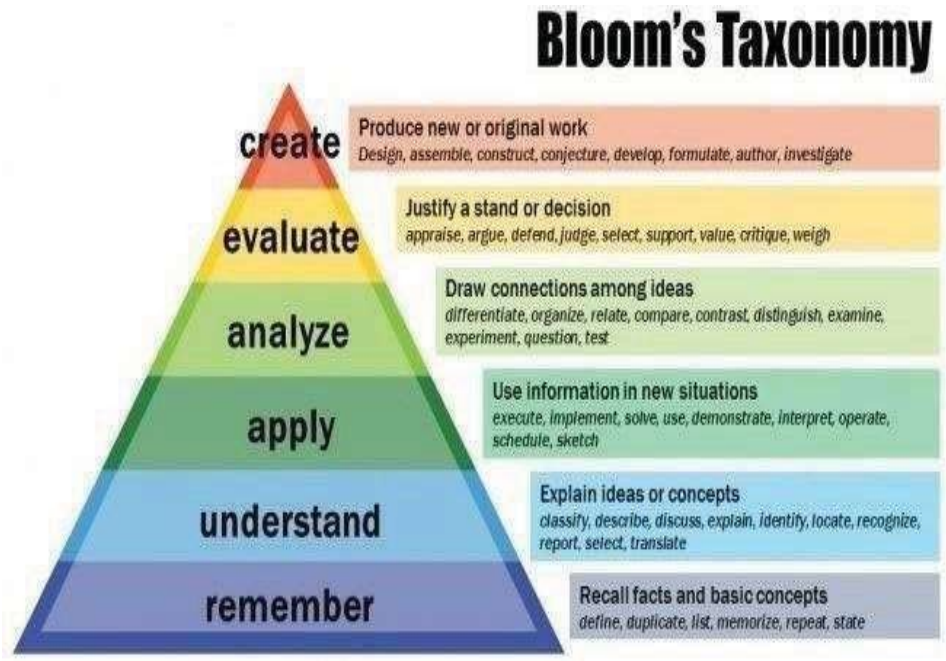
Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi- disciplinary environments.

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 evaluationsof student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.



www.newhorizonindia.edu

Ring Road, Bellandur Post, Near Marathahalli,
Bengaluru, Karnataka 560103, India.

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