Your Dreams Our Goal

POORNIMA
U N I V E R S I T Y

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

FACULTY OF
ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

SCHEME & SYLLABUS
BOOKLET

BATCH 2023-2027

SCHEME & SYLLABUS

BATCH: 2023-27

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Disclaimer: The scheme, syllabus and other materials published in this booklet may be changed or modified as per the requirement after approval of competent authority. The decision taken by the management of Poornima University will be final and abiding to all.

Student Details

Name of Student:

Name of Program:

Semester:

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

VISION

To create knowledge based society with scientific temper, team spirit and dignity of labor to face global competitive challenges.

Mission

To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

Quality Policy

To provide Quality Education through Faculty development, updating of facilities and continual improvement meeting University norms and keeping stake holders satisfied

Knowledge Wheel

At Poornima, the academic atmosphere is a rare blend of modern technical aswell as soft skills and traditional systems of learning processes.
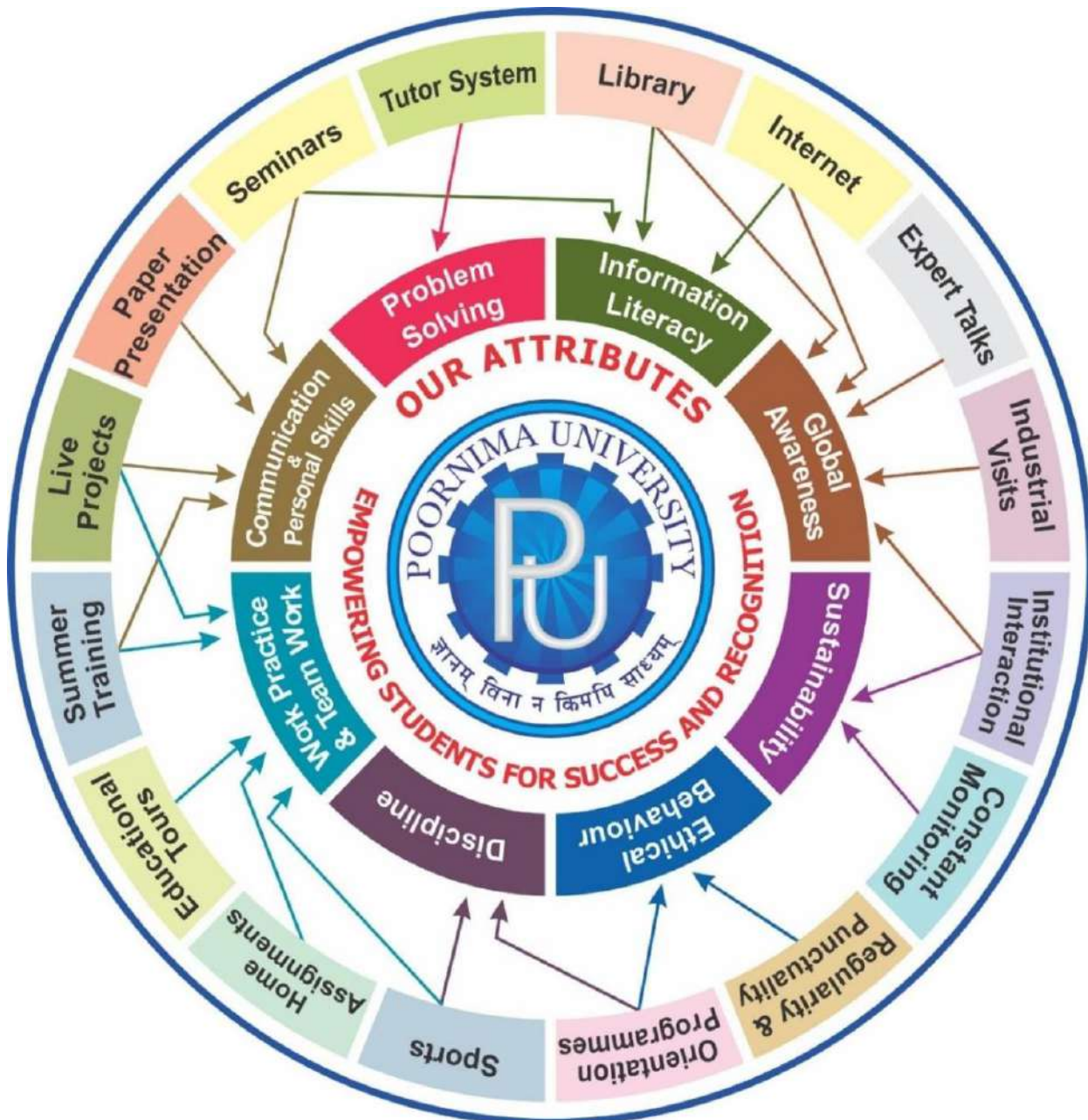
About Program and Program Outcomes (PO):

Title of the Programme: Bachelor of Technology (B. Tech.)

**Nature of the Programme:** B. Tech. is four year full-time programme.

## Program Outcomes (PO) :

Engineering Graduates will be able to:

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

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

C. **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.

D. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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

F. **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.

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

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

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

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

K. **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.

L. **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.

Examination System :

A. Marks Distribution of Theory Course:
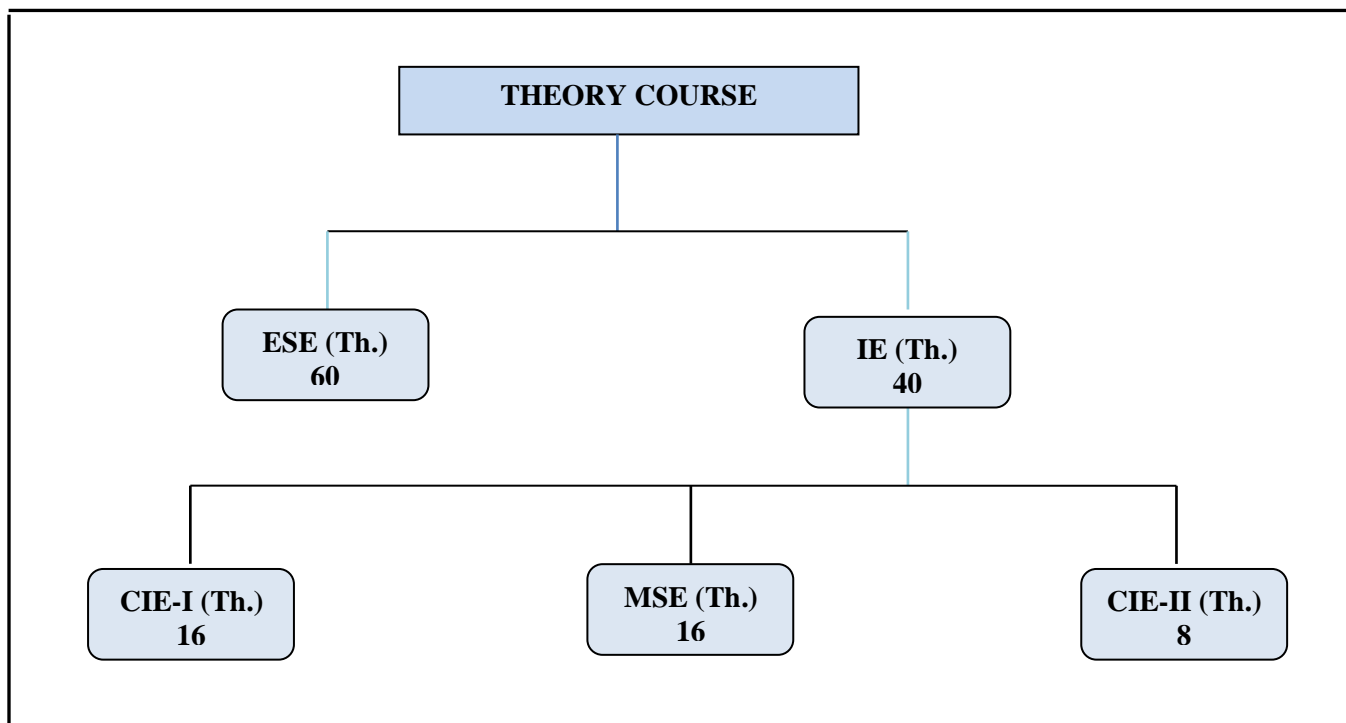
B. Marks Distribution of Practical Course :
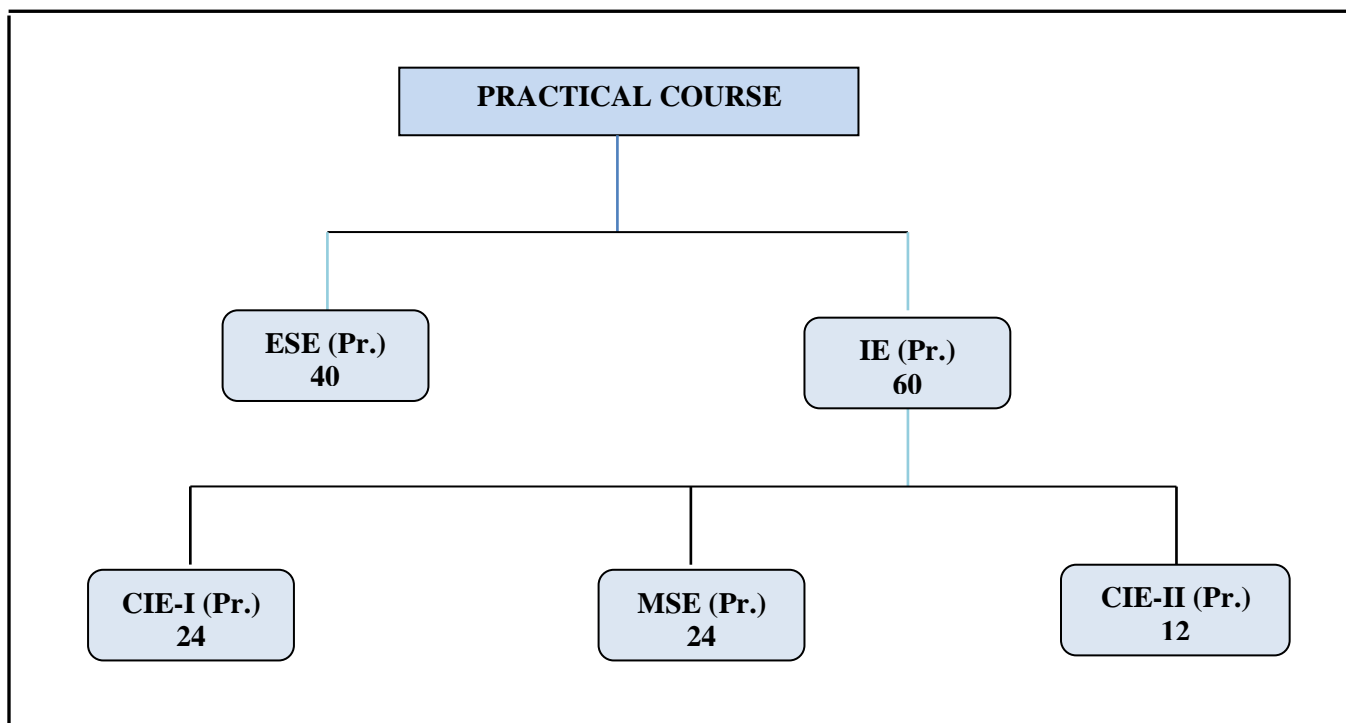
Th.: Theory, **Pr.**: Practical, **ESE:** End Semester Examination, **MSE:** Mid Semester Examination, **CIE:** Continuous Internal Evaluation.

CO Wise Marks Distribution:

Exam Entity	Theory Subject		Practical/ Studio Subject	
	Maximum Marks	CO to be Covered	CO to be Covered	Maximum Marks
CIE-I	16 (8 + 8)	1 & 2	1 & 2	24 (12 + 12)
MSE	16 (8 + 8)	3 & 4	3 & 4	24 (12 + 12)
CIE-II (Activity/ Assignment)	8 (8)	5	5	12 (12)
ESE	60	-	-	40
TOTAL	100	-	-	100

Minimum Passing Percentage in All Exams:

S No.	Program Name	Minimum Passing Percentage in		
		IE Component	ESE Component	Total Component
1	Course Work for PhD Registration	-	-	50%
2	B. Arch.	-	45%	50%
3	MBA, MCA, M.Des., M.Tech., M.Plan, MHA, MPH	-	40%	40%
4	MBA, MCA, M.Des., M.Tech., M.Plan, MHA, MPH	-	35%	35%

SGPA Calculation

$$SGPA = \frac{C_1G_1 + C_2G_2 + \ldots + C_nG_n}{C_1 + C_2 + \ldots + C_n}$$

$$SGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i,

G_i is the Grade Point for the subject I and i = 1 to n,

n = number of subjects in a course in the semester

CGPA Calculation

$$CGPA = \frac{C_1G_1 + C_2G_2 + \ldots + C_nG_n}{C_1 + C_2 + \ldots + C_n}$$

$$CGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i,

G_i is the Grade Point for the subject I and i = 1 to n,

n = number of subjects in a course of all the semesters up to which CGPA is computed

Grading Table:

Applicable for B.Arch. & Ph.D. Courses				Applicable for All Courses except B.Arch. & Ph.D.			
Academic Performance	Grade	Grade Point	Marks Range (in %)	Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	O	10	$90 \leq x \leq 100$	Outstanding	O	10	$90 \leq x \leq 100$
Excellent	A+	9	$80 \leq x < 90$	Excellent	A+	9	$80 \leq x < 90$
Very Good	A	8	$70 \leq x < 80$	Very Good	A	8	$70 \leq x < 80$
Good	B+	7	$60 \leq x < 70$	Good	B+	7	$60 \leq x < 70$
Above Average	B	6	$50 \leq x < 60$	Above Average	B	6	$50 \leq x < 60$
Fail	F	0	$x < 50$	Average	C	5	$40 \leq x < 50$
Absent	Ab	0	Absent	Pass	P	4	$35 \leq x < 40$
				Fail	F	0	$x < 35$
				Absent	Ab	0	Absent

CGPA to percentage conversion rule:

Equivalent % of Marks in the Program = *CGPA* ***10**

Award of Class

CGPA	Percentage	Equivalent Division
$7.50 \leq CGPA$	75% or more	First Division with Distinction
$6.00 \leq CGPA < 7.50$	$60\% \leq x < 75\%$	First Division
$5.00 \leq CGPA < 6.00$	$50\% \leq x < 60\%$	Second Division
$4.00 \leq CGPA < 5.00$	$40\% \leq x < 50\%$	Pass Class

Guidelines for Massive Open Online Courses (MOOCs)
(Session 2023-24)

Poornima University, in its never ending endeavor to equip students with best-of-class learning and knowledge, has undertaken to include MOOC courses as part of its credit scheme from session 2023-24 onwards. The objective behind this is to enable students to study courses designed by the best teachers in the country and to scale their knowledge base with the rest of learners from the nation. The MOOCs which are included under this scheme is can be chosen from SWAYAM and NPTEL.

1.   Introduction of MOOCs: SWAYAM and NPTEL

About SWAYAM:

SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

This is done through a platform that facilitates hosting of all the courses, taught in classrooms to be accessed by anyone, anywhere at any time. All the courses are interactive, prepared by the best teachers in the country and are available, free of cost to any learner. However learners wanting a SWAYAM certificate should register for the final proctored exams that come at a fee and attend in-person at designated centers on specified dates. Eligibility for the certificate will be announced on the course page and learners will get certificates only if this criteria is matched.

The courses hosted on SWAYAM are in 4 quadrants – (1) video lecture, (2) specially prepared reading material that can be downloaded/printed (3) self-assessment tests through tests and quizzes and (4) an online discussion forum for clearing the doubts. Steps have been taken to enrich the learning experience by using audio-video and multi-media and state of the art pedagogy / technology.

In order to ensure that best quality content is produced and delivered, nine National Coordinators have been appointed. They are:

1.   AICTE (All India Council for Technical Education) for self-paced and international courses
2.   NPTEL (National Programme on Technology Enhanced Learning) for Engineering
3.   UGC (University Grants Commission) for non-technical post-graduation education
4.   CEC (Consortium for Educational Communication) for under-graduate education
5.   NCERT (National Council of Educational Research and Training) for school education
6.   NIOS (National Institute of Open Schooling) for school education
7.   IGNOU (Indira Gandhi National Open University) for out-of-school students
8.   IIMB (Indian Institute of Management, Bangalore) for management studies
9.   NITTTR (National Institute of Technical Teachers Training and Research) for Teacher Training programme

Two types of courses are offered on SWAYAM platform: Credit Courses and Non- Credit Courses. Credit courses are offered for each semester in January and July every year. The list is available on SWAYAM official website: https://onlinecourses.swayam2.ac.in/

About NPTEL:

NPTEL (National Programme on Technology Enhanced Learning), is a joint venture of the IITs and IISc, funded by the Ministry of Education (MoE) Government of India, and was launched in 2003. Initially started as a project to take quality education to all corners of the country, NPTEL now offers close to 600+ courses for certification every semester in about 22 disciplines.

Some highlights:

▪ Largest online repository in the world of courses in engineering, basic sciences and selected humanities and management subjects

▪ YouTube channel for NPTEL – most subscribed educational channel, 1.3 billion views and 40+ lakhs subscribers

- More than 56000 hours of video content, transcribed and subtitled

- Most accessed library of peer-reviewed educational content in the world

- Translation of more than 12000 hrs of English transcripts in regional Indian languages

NPTEL Online Certification:

The objective of enabling students obtain certificates for courses is to make students employable in the industry or pursue a suitable higher education programme. Through an online portal, 4, 8, or 12-week online courses, typically on topics relevant to students in all years of higher education along with basic core courses in sciences and humanities with exposure to relevant tools and technologies, are being offered. Enrolment to and learning from these courses is free. Following these online courses, an in-person, proctored certification exam is conducted and a certificate is provided through the participating institutions and industry, as applicable.

Some statistics regarding the open online courses since March 2014 till Dec 2021

Completed courses: 3496;

Enrollments across courses: 1.58 CRORE +

Number of exam registrations: 15.1 LAKH +

All the statistics pertaining to completed courses are available at https://beta.nptel.ac.in/courses.

All courses are completely free to enroll and learn from. The certification exam is optional and comes at a fee of Rs 1000/course exam.

2. MOOCs at Poornima University:

MOOCs envelops best in class teaching - learning processes along with meeting the requirements of various courses in terms of quality of teaching and evaluation system. To promote the MOOCs among students of Poornima University, it is decided to consider the credits earned through MOOCs.

(a) Options for MOOCs at Poornima University
(For this document, only those MOOCs will be considered which are available on SWAYAM & NPTEL platforms)

- Credit and Non-credit SWAYAM MOOCs can be opted by anyone, anytime, anywhere and in any language. However, prior-permission of the University Authorities is mandatory if the credits are to be transferred to regular degree.

- In case of credit courses, there are two ways to opt these courses for the purpose of credit transfer to PU system as given below:

OPTION–I: As Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards):

Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards) are available at University level in offline mode for which relevant booklets are already published. **These courses carries 02 credits.** These category/type of courses (similar/different) are also available as MOOC courses. The respective Deans / HODs shall provide both the options to all the students to either select offline courses or MOOCs as per details given below:

- Deans / HODs shall prepare a list of upto 05 appropriate MOOC courses of 02/03 credits each, well in advance (at-least 15 days prior to commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.

- After approval, the respective Deans / HODs shall circulate a notice to all their respective students so that they can select any one course from the list, the credits **(only 02)** of which will be counted against Open Elective/ Multidisciplinary courses pertaining to that particular semester.

- If the students are not willing to opt for MOOC Open Elective/ Multidisciplinary course, they can proceed with the current offline practice of opting for Multidisciplinary courses.

- The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean.

<div align="center">**OR**</div>

OPTION–II: As Major / Minor Courses:

- Deans / HODs shall identify a course of **03 credits** for each semester, well in advance (at-least 15 days prior to commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.

- After approval, the respective Deans / HODs shall circulate a notice to all their respective students citing that the particular course will be conducted through MOOCs only and is compulsory for all respective students. The credits of this course will be counted against Major/Minor courses pertaining to that particular semester.

- The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean.

- This is to be noted that if Deans / HODs decide to conduct any major/minor course in any semester through MOOCs, no offline course will be conducted against that.

(b) Important points related to MOOCs at Poornima University

- Only one MOOC shall be allowed in a particular semester for the purpose of credit transfer in the beginning.

- No attendance will be taken for MOOC courses.

- Last period of T/T/S shall be taken for MOOC courses which shall be in self-study mode.

- The method of assessments of MOOC such as assignments and examination are completely associated with that particular MOOC and no exam will be conducted by the department as well as by the Examination Cell.

- The respective Dean / HOD must submit the detail of course i.e., code, name and credit of MOOC opted against that particular course in particular semester attached with highlighting in the related examination scheme of syllabus of that semester signed by BOS Convener / HoD and Dean of Faculty to the office of Pro-President before commencement of the classes.

- SWAYAM will award a certificate to all the students passing the examination along with the credit earned. The center of examination for SWAYAM MOOCs will be finalized by SWAYAM. All the responsibility related to registration for MOOCs, timely submission of assignments, examinations etc. will be borne by the students only.

- The list of registered students in MOOC along with name of course will be submitted to the Examination Cell by the Deans / HoDs before commencement of the classes.

- Any student who would not be able to register/present/clear/pass the MOOC in the stipulated time, it is the choice of the student that he or she may register in next semester (odd or even) with MOOC again or appear as a back exam candidate of the University as per PU norms.

- There will be no provision of re-evaluation of MOOC.

- The scorecard and related certificate of MOOC along with a consolidated list of students with marks of assignment and final exam will be submitted to the examination cell by the concerned Dean / HOD for further process. It is also recommended that alteration/changes/scaling in marks obtained by the students in any MOOC will not be considered.

- The exam registration fee of MOOC up to Max. INR 1000/- will be reimbursed to the student only after successful completion of the course in first attempt and submission of the fee receipt, score-card and certificate of the MOOC to the concerned department within stipulated time after declaration of the results.

NOTE: This is to be noted that the procedure for getting approval from BOS, Faculty Board, Academic Council and BoM is to be followed as per regular process.

Attached Items:

Open Elective Booklet	Annexure-1
Soft Skills Booklet	Annexure-2
Value Added Course Booklet	Annexure-3

Required credits for Honors:

S.No	Program Duration	Required credits for Honors
1.	2- Year	10- Credits
2.	3- Year	15- Credits
3.	4-Year	20- Credits

S. No	NPTEL/ SWAYAM Course duration (in weeks)	Equivalent Credits
1	4	2
2	8	3
3	12	4

Attached Items:

Open Elective Booklet	Annexure-1
Soft Skills Booklet	Annexure-2
Value Added Course Booklet	Annexure-3

Faculty of Engineering and Technology

Name of Program: B.Tech. in Civil Engineering   **Duration: 4 Years**   **Total Credits: 174**

Teaching Scheme for Batch 2023-27

Semester-I

Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	
A.		Major (Core Courses)							
A.1	**Theory**								
BTXCSA1101	Basic Science for Engineers	3	-	-	1*	40	60	100	3
BTXCCE1102	Fundamental of Computer	3	-	-	1+1*	40	60	100	3
BTXCCV1103	Basics of Civil Engineering	3	-	-	1+1*	40	60	100	3
BTXCSA1105	Engineering Mathematics	3	-	-	1*	40	60	100	3
A.2	**Practical**								
BTXCSA1201	Basic Science lab	-	-	2		60	40	100	1
BTXCCE1202	Programming in C Lab		-	2		60	40	100	1
BTXCCV1203/ BTXCEE1204	Computer Aided Design (CADD)/ Basics of Electrical and Electronics Engineering Lab	-	-	2		60	40	100	1
BTXCME1205/ BTXCME1206	Workshop Practice	-	-	2		60	40	100	1
BTXCCE1207	Exploratory Project	-	-	2	2*	60	40	100	1
B.		Minor Stream Courses/ Department Electives							
B.1	**Theory**								
B.2	**Practical**								
	-								
C		Multidisciplinary Courses							
		-	-	-					
D		Ability Enhancement Courses (AEC)							
BULCHU1101	English	2	-	-		40	60	100	2
E		Skill Enhancement Courses (SEC)							
BULCSE1201	Skill Enhancement Generic Course-I	-	-	2		60	40	100	1
F		Value Added Courses (VAC)							
BUVCSA1102	Environmental Studies	2	-	-		40	60	100	2
G		Summer Internship / Research Project / Dissertation							
	Total	16	0	12	2/2+6*				**22**
Total Teaching Hours		30/36							

SH: Supporting Hours
*Classes will be conducted fortnightly.

		POORNIMA UNIVERSITY, JAIPUR							
		Faculty of Engineering and Technology							
		Name of Program: B.Tech. in Civil Engineering **Duration: 4 Years** **Total Credits: 174**							
		Teaching Scheme for Batch 2023-27							
		Semester-II							
		Teaching Scheme				**Marks Distribution**			**Cre dits**
Course Code	**Name of Course**	**Lecture (L)**	**Tutorial (T)**	**Practical (P)**	**SH**	**IE**	**ESE**	**Total**	
A.		**Major (Core Courses)**							
A.1	**Theory**								
BTXCCE2101	Python	3	-	-	2*	40	60	100	3
BTXCCV2102/ BTXCEE2103	Basic of Civil Engineering / Basics of Electrical and Electronics Engineering	3	-	-	1+1*	40	60	100	3
BTXCSA2104/ BTXCME2105	Engineering Mathematics / Basic of Mechanical Engineering	3	-	-	1+1*	40	60	100	3
A.2	**Practical**								
BTXCCE2201	Programming in Python Lab	-	-	2		60	40	100	1
BTXCCV2202/ BTXCEE2203	Computer Aided Design (CADD)/ Basics of Electrical and Electronics Engineering Lab	-	-	2		60	40	100	1
BTXCME1205/ BTXCME1206	Workshop Practice/Engineering Graphics	-	-	2		60	40	100	1
BTXCCE1207	Exploratory Project	-	-	2	2*	60	40	100	1
B.		Minor Stream Courses/ **Department Electives**							
B.1	**Theory (Any One)**								
BTXECE2111 BTXECE2112 BTXECE2113 BTXECE2114 BTXEME2116 BTXECE2115	• Introduction to AI&DS • Introduction to Cyber Security • Introduction to Cloud • Introduction to Game Tech. • Engineering Mechanics • Digital Electronics	3	-	-		40	60	100	3
B.2	**Practical**								
C		**Multidisciplinary Courses**							
BTXEBX2109	MOOC Course-I (Human Behaviour)	2	0	0					2
D		**Ability Enhancement Courses (AEC)**							
BULCHU2204	Language Lab	0	0	2		60	40	100	1
E		**Skill Enhancement Courses (SEC)**							
BULCSE2201	Skill Enhancement Generic Course-II	-	-	2		60	40	100	1
F		**Value Added Courses (VAC)**							
BUVCPH2102	Health Behaviour & Communication	2	-	-		40	60	100	2
G		**Summer Internship / Research Project / Dissertation**							
		-	-	-					
	Total	16	-	12	2/2+6*				**22**
	Total Teaching Hours	**30/36**							

SH: Supporting Hours
*Classes will be conducted fortnightly.

<table>
<tr><td colspan="10">POORNIMA UNIVERSITY, JAIPUR</td></tr>
<tr><td colspan="10">Faculty of Engineering and Technology</td></tr>
<tr><td colspan="10">Name of Program: B. Tech. Civil Engineering   Duration: 4 Years   Total Credits: 174</td></tr>
<tr><td colspan="10"><u>Teaching Scheme for Batch 2023-27</u></td></tr>
</table>

		Semester-III							
		Teaching Scheme				**Marks Distribution**			**Cr ed its**
Course Code	**Name of Course**	**Lecture (L)**	**Tutorial (T)**	**Practical (P)**	**SH**	**IE**	**ESE**	**Total**	
A.		**Major (Core Courses)**							
A.1	**Theory**								
BCVCSA3101	Engineering Mathematics - II	3	0	0	1*	40	60	100	3
BCVCCV3102	Fluid Mechanics	3	0	0	1*	40	60	100	3
BCVCCV3103	Strength of Material	3	0	0	1*	40	60	100	3
A.2	**Practical**								
BCVCCV3201	Fluid Mechanics Lab	0	0	2		60	40	100	1
BCVCCV3202	Material Testing Lab	0	0	2		60	40	100	1
BCVCCV3203	Structure Drawing Lab	0	0	2		60	40	100	1
BCVCCV3204	Technical Seminar	0	0	2	2*	60	40	100	1
BCVCCV3205	Engineering Geology Lab	0	0	2		60	40	100	1
B.		Minor Stream Courses / **Department Electives**							
B.1	**Theory (Any one)**								
BCVECV3111	Building Material & Construction								
BCVECV3112	Sustainable Construction	3	0	0	1*	40	60	100	3
BCVECV3113	Building By laws								
B.2	**Practical**								
	-								
C		**Multidisciplinary Courses**							
BCVEBX3109	MOOC Course-II	2	0	0					2
D		**Ability Enhancement Courses (AEC)**							
BULCHU3106	Interpersonal Communication & Grooming	0	0	2		40	60	100	2
E		**Skill Enhancement Courses (SEC)**							
BULCSE3201	Skill Enhancement Generic Course-III	0	0	2		60	40	100	1
F		**Value Added Courses (VAC)**							
BUVCCE3101	Digital Marketing	2	0	0		40	60	100	2
G		**Summer Internship / Research Project / Dissertation**							
	-	16		14	6*				24
Total Teaching Hours		**30/36**							

SH: Supporting Hours
*Classes will be conducted fortnightly.

POORNIMA UNIVERSITY, JAIPUR

Faculty of Engineering and Technology

Name of Program: B.Tech. in Civil Engineering   **Duration: 4 Years   Total Credits: 174**

Teaching Scheme for Batch 2023-27

Course Code	Name of Course	Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	Credits
		Teaching Scheme				**Marks Distribution**			
A.	Major (Core Courses)								
A.1	**Theory**								
BCVCCV4101	Structure Analysis-I	3	1	0		40	60	100	4
BCVCCV4102	Surveying	3	0	0	1*	40	60	100	3
BCVCCV4103	Concrete and Construction Technology	3	0	0	1*	40	60	100	3
BCVCCV4104	Energy Efficient Buildings	3	0	0	1*	40	60	100	3
A.2	**Practical**								
BCVCCV4201	Concrete Lab	0	0	2		60	40	100	1
BCVCCV4202	Surveying Lab	0	0	2	1*	60	40	100	1
BCVCCV4203	AutoCAD Lab	0	0	2	1*	60	40	100	1
	Minor Stream Courses / **Department Electives**								
B.1	**Theory**								
BCVECV4111	Sustainability in Building Design and Construction	3	0	0	1*	40	60	100	3
BCVECV4112	Sustainable Development								
BCVECV4113	Construction Equipment's								
B.2	**Practical**								
C	Multidisciplinary Courses (MC)								
BCVEBX4109	MOOC Course-III (Fundamentals of Marketing-I)	2	0	0		40	60	100	2
D	Ability Enhancement Courses (AEC)								
BULCHU4109	Negotiation Skills & Persuasive Communication	0	0	2		60	40	100	2
E	Skill Enhancement Courses (SEC)								
BULCSE4201	Skill Enhancement Generic Course-IV	0	0	2		60	40	100	1
BCVCSE4202	Skill Enhancement Technical Course-I	0	0	2		60	40	100	2
F	Value Added Courses (VAC)								
	-	-	-	-					
G	Summer Internship / Research Project / Dissertation								
	Total	17	1	12	6*				
Total Teaching Hours		**30/36**							**26**

SH: Supporting Hours

*Classes will be conducted fortnightly.

Faculty of Engineering and Technology

Name of Program: B.Tech. in Civil Engineering   Duration: 4 years   Total Credits: 174

Teaching Scheme for Batch 2023-27

Semester-V

Course Code	Name of Course	Teaching Scheme			SH	Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)		IE	ESE	Total	
A.		**Major (Core Courses)**							
A.1	**Theory**								
BCVCCV5101	Structural Analysis-II	3	0	0	1*	40	60	100	3
BCVCCV5102	Design of Concrete Structures-I	3	0	0	1*	40	60	100	3
BCVCCV5103	Design of Steel Structures-I	3	0	0	1*	40	60	100	3
BCVCCV5104	Transportation Engineering	3	0	0	1*	40	60	100	3
A.2	**Practical**								
BCVCCV5201	Road Material Testing Lab	0	0	2		60	40	100	1
BCVCCV5202	Concrete Design Lab	0	0	2		60	40	100	1
BCVCCV5203	Steel Design Lab	0	0	2		60	40	100	1
BCVCCV5204	Industrial Technical Seminar-I	0	0	2		60	40	100	1
B.		Minor Stream Courses **/ Department Electives**							
B.1	**Theory (Any One)**								
BCVECV5111	Environmental Engineering	3	0	0	1*	40	60	100	3
BCVECV5112	Solid Waste Management								
BCVECV5113	Waste Water Engineering								
B.2	**Practical**								
C		**Multidisciplinary Courses**							
BCVEBX5109	MOOC Course-IV (Fundamental of Marketing –II)	2	0	0					2
D		**Ability Enhancement Courses (AEC)**							
BULCHU5115	Entrepreneurial & Managerial Skills	0	0	2		60	40	100	1
E		**Skill Enhancement Courses (SEC)**							
BULCSE5201	Skill Enhancement Generic Course-V	0	0	2		60	40	100	1
BULCSE5202	Skill Enhancement Generic Course-VI	0	0	2		60	40	100	1
F		**Value Added Courses (VAC)**							
		-	-	-					
G		**Summer Internship / Research Project / Dissertation**							
	Total	17	0	14	5*				
	Total Teaching Hours	30/36							24

SH: Supporting Hours
*Classes will be conducted fortnightly.

POORNIMA UNIVERSITY, JAIPUR

Faculty of Engineering and Technology

Name of Program: B.Tech. in Civil Engineering   Duration: 4 Years   Total Credits: 174

Teaching Scheme for Batch 2023-27

		Semester-VI							
Course Code	**Name of Course**	**Teaching Scheme**				**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorial (T)**	**Practical (P)**	**SH**	**IE**	**ESE**	**Total**	
A.	**Major (Core Courses)**								
A.1	Theory								
BCVCCV6101	MOOC Course (As Described in Annexure-II)	3	0	0		40	60	100	3
A.2	Practical								
BCVCCV6201	Industrial Technical Seminar-II	0	0	4		60	40	100	2
B.	**Minor Stream Courses / Department Electives**								
B.1	Theory								
	-								
B.2	Practical								
	-								
C	**Multidisciplinary Courses**								
	-	-	-	-					
D	**Ability Enhancement Courses (AEC)**								
	-	-	-	-					
E	**Skill Enhancement Courses (SEC)**								
	-	-	-	-					
F	**Value Added Courses (VAC)**								
	-	-	-	-					
G	**Summer Internship / Research Project / Dissertation**								
BCVCCV6401	Internship	0	0	12		40	60	100	6
Total		3	0	16					**11**
Total Teaching Hours		19							

SH: Supporting Hours

*Classes will be conducted fortnightly.

POORNIMA UNIVERSITY, JAIPUR

Faculty of Engineering and Technology

Name of Program: B.Tech. in Civil Engineering   Duration: 4 Years   Total Credits: 174

Teaching Scheme for Batch 2023-27

Semester-VII

Course Code	Name of Course	Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	Credits
A.				**Major (Core Courses)**					
A.1	**Theory**								
BCVCCV7101	Geotechnical Engineering-I	3	0	0		40	60	100	3
BCVCCV7102	Design of Concrete Structures-II	3	1	0	1*	40	60	100	4
BCVCCV7103	Design of Steel Structures-II	3	0	0	1*	40	60	100	3
BCVCCV7104	Estimation and Costing	3	0	0	0	40	60	100	3
A.2	**Practical**								
BCVCCV7201	Geotechnical Engineering Lab-I	0	0	2		60	40	100	1
BCVCCV7202	Concrete Design Lab	0	0	2	1*	60	40	100	1
BCVCCV7203	Quantity Surveying and Valuation Lab	0	0	2		60	40	100	1
BCVCCV7204	AI in Building Automation	0	0	2		60	40	100	1
BCVCCV7205	Steel Design Lab	0	0	2		60	40	100	1
B.				Minor Stream Courses**/ Department Electives**					
B.1	**Theory (Any One)**								
BCVECV7111	Ground Improvement Techniques								
BCVECV7112	Ground Water Contamination								
BCVEBX7113	Principle of Finance								
B.2	**Practical**								
	-								
C				**Multidisciplinary Courses**					
D				**Ability Enhancement Courses (AEC)**					
		-	-	-					
E				**Skill Enhancement Courses (SEC)**					
	-	-	-	-					
F				**Value Added Courses (VAC)**					
	-	-	-	-					
G				**Summer Internship / Research Project / Dissertation**					
BCVCCV7301	Minor Project	0	0	4	3*	60	40	100	2
	Total	15	1	14	6*				23
	Total Teaching Hours			30 / 36					

SH: Supporting Hours
*Classes will be conducted fortnightly.

		POORNIMA UNIVERSITY, JAIPUR							
		Faculty of Engineering and Technology							
		Name of Program: B.Tech. in Civil Engineering **Duration: 4 Years** **Total Credits: 174**							
		<u>**Teaching Scheme for Batch 2023-27**</u>							
		Semester-VIII							
Course Code	**Name of Course**	**Teaching Scheme**			**SH**	**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorial (T)**	**Practical (P)**		**IE**	**ESE**	**Total**	
A.		**Major (Core Courses)**							
A.1	**Theory**								
BCVCCV8101	Construction Planning & Management	3	0	0		40	60	100	3
BCVCCV8102	Geotechnical Engg-II	3	0	0	1*	40	60	100	3
A.2	**Practical**								
BCVCCV8201	Geotechnical Engg-II Lab	0	0	2		60	40	100	1
BCVCCV8202	Academic Research Paper Writing and IPR	0	0	2		60	40	100	1
BCVCCV8203	Valuation of Building Structure	0	0	2		60	40	100	1
B.		Minor Stream Courses/**Department Electives**							
B.1	**Theory**								
BCVECV8111	E-waste Utilization in Construction Industry	3	0	0		40	60	100	3
BCVECV8112	Plastic Waste Management								
BCVECV8113	Solid Waste Management								
B.2	**Practical**								
C		**Multidisciplinary Courses**							
		-	-	-					
D		**Ability Enhancement Courses (AEC)**							
		-	-	-					
E		**Skill Enhancement Courses (SEC)**							
		-	-	-					
F		**Value Added Courses (VAC)**							
		-	-	-					
G		**Summer Internship / Research Project / Dissertation**							
BCVCCV8301	Major Project			20		60	40	100	10
Total		9		26	1				22
Total Teaching Hours		**30/36**							

SH: Supporting Hours
*Classes will be conducted fortnightly.

POORNIMA UNIVERSITY, JAIPUR
Faculty of Engineering and Technology

Name of Program: B.Tech. in Civil Engineering   Duration: 4 Years   Total Credits: 174

Teaching Scheme for Batch 2023-27

Semester-I

Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	
A.		**Major (Core Courses)**							
A.1	**Theory**								
BTXCSA1101	Basic Science for Engineers	3	-	-	1*	40	60	100	3
BTXCCE1102	Fundamental of Computer	3	-	-	1+1*	40	60	100	3
BTXCCV1103	Basics of Civil Engineering	3	-	-	1+1*	40	60	100	3
BTXCSA1105	Engineering Mathematics	3	-	-	1*	40	60	100	3
A.2	**Practical**								
BTXCSA1201	Basic Science lab	-	-	2		60	40	100	1
BTXCCE1202	Programming in C Lab		-	2		60	40	100	1
BTXCCV1203/ BTXCEE1204	Computer Aided Design (CADD)/ Basics of Electrical and Electronics Engineering Lab	-	-	2		60	40	100	1
BTXCME1205/ BTXCME1206	Workshop Practice	-	-	2		60	40	100	1
BTXCCE1207	Exploratory Project	-	-	2	2*	60	40	100	1
B.		**Minor Stream Courses/ Department Electives**							
B.1	**Theory**								
B.2	**Practical**								
	-								
C		**Multidisciplinary Courses**							
		-	-	-					
D		**Ability Enhancement Courses (AEC)**							
BULCHU1101	English	2	-	-		40	60	100	2
E		**Skill Enhancement Courses (SEC)**							
BULCSE1201	Skill Enhancement Generic Course-I	-	-	2		60	40	100	1
F		**Value Added Courses (VAC)**							
BUVCSA1102	Environmental Studies	2	-	-		40	60	100	2
G		**Summer Internship / Research Project / Dissertation**							
	Total	16	0	12	2/2+6*				**22**
Total Teaching Hours		**30/36**							

SH: Supporting Hours
*Classes will be conducted fortnightly..

BTXCSA1101	Basic Science for Engineers	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES

The Students will be able

CO1.Point out the basic principles of relativity, twin paradox and energy-mass relations

CO2.Produce coherent sources and phenomenon of interference

CO3To learn about the laser and apply it for suitable applications manufacturing of cement and the chemistry involved in setting and hardening of it.

CO4 To use their knowledge of polymers and its use in industries and daily life.

CO5To develop innovative methods to produce soft water for industrial use and potable water at cheaper cost

A.OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit(Hours)
1.	Special Theory of Relativity	7
2.	Wave Optics	7
3.	Laser & Binding Materials	8
4.	Polymer	8
5.	Water Technology	6

B.DETAILED SYLLABUS

Unit	Unit Details
1.	**Special Theory of Relativity**
	• Introduction of Unit • Inertial and non-inertial frames of Reference. • Postulates of special theory relativity • Galilean and Lorentz Transformations, Length contraction and Time Dilation. • Relativistic Mass-Energy relation • Conclusion of Unit
2.	**Wave Optics**
	• Introduction of Unit • Interference of light**:** Types of interference, • Coherent source, methods to produce coherent sources with examples. • Newton's Rings: Principle, Construction, working &Applications • Conclusion of Unit
3.	**Laser & Binding Materials**
	• Introduction of Unit • Theory of laser action: Einstein's Coefficients, Components of laser, Threshold conditions for laser action • Theory, Design and Applications of He-Ne Laser • Cement: Composition and Significance of cement • Manufacturing of Portland cement by Rotary Kiln Technology • Chemistry of setting and hardening of cement and role of gypsum • Conclusion of Unit
4.	**Polymer**
	• Introduction of Unit • Classification of Polymers and Types of polymerization • Plastics: Constituents of plastics, Thermosets and Thermoplastics, Preparation, Properties and Uses of Polyethylene, Bakelite, Teflon and Nylon • Elastomers: Natural rubber, Vulcanization, Synthetic rubber- Preparation, Properties and Applications of SBR, Buna-N, Butyl and Neoprene rubber • Conclusion of Unit

5.	**Water Technology**
	• Introduction of Unit
	Water
	• Sources of water, Impurities in water and effect of impurities
	• Municipal water supply: Requisites of drinking water, Steps involved in purification of water, Sedimentation, Coagulation, Filtration and Disinfection, Break Point Chlorination
	Water Analysis
	• Hardness of water; Type of hardness, Degree of hardness, Units of hardness, Disadvantages of hard water, Determination of hardness by Complexometric (EDTA) method.
	• Treatment of hard water: Lime-soda method, Permutit (zeolite) method and Deionization or Demineralization method
	• Desalination: Reverse osmosis, Electrodialysis
	• Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1.	Fundamental of Optics	Jenkins and While	4th	Tata McGraw-Hill
2.	Optics	Ajoy Ghatak	3rd	Tata McGraw-Hill
3.	Introduction to special Theory of Relativity	R. Resnick	Latest	Johan Willy Singapore
4.	Engineering Chemistry	P.C. Jain	Latest	Dhanpat Rai&Sons
5.	Engineering Chemistry	S. S. Dara	Latest	S. Chand & Co

MAPPING OF COURSE OUTOCMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	1	-	-	-	-	-
CO2	3	2	3	3	-	-	2	-	-	-	-	-
CO3	2	2	1	1	-	-	2	-	-	-	-	-
CO4	3	1	2	1	-	-	2	-	-	-	-	-
CO5	2	2	1	1	-	-	2	-	-	-	-	-

MAPPING OF COURSE OUTOCMES WITH PROGRAMME SPECIFIC OUTCOMES

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	2	-	-
CO3	2	-	-
CO4	2	-	-
CO5	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

BTXCCE1102	Fundamental of Computer	3 Credits [LTP: 3-0-0]

Course Outcomes: -

Students will be able to:

- Learn data types, loops, functions, array, pointers, string, structures and files.
- Develop conditional and iterative statements to write C programs.
- Implement concept of string using array.
- Allocate memory dynamically using pointers.
- Apply C Programming to solve real time problems.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Introduction to C Programming**	**6**
2.	**Decision Making & Looping**	**6**
3.	**Array and string**	**8**
4.	**Advance programming in C**	**8**
5.	**File handling & Additional features**	**8**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to C Programming**
	• Introduction of Unit • Introduction to computer-based problem solving, Program design and implementation issues-Flowcharts & Algorithms. • Types of Languages – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters. • Overview of C, Data Types, Constants & Variables, Literals, Operators & Expressions • Conclusion &Real Life Application
2.	**Decision Making & Looping**
	• Introduction of Unit • Decision making in C- if statement, if-else statement, Nested if statement, if else if Ladder, Switch case • Loop control in C – for loop, while loop • Control flow in C- break, continue and goto statement. • Conclusion &Real Life Application
3.	**Array and string**
	• Introduction of Unit • Array- 1D array, 2D array • Scope rules- Local & global variables. • Functions-parameter passing call by value and call by reference, calling functions with arrays, command line argument. • String – String in-build functions. • Conclusion of the Unit
4.	**Advance programming in C**
	• Introduction of Unit • Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions. • Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers. • Conclusion of the Unit

5.	**File handling & Additional features**
	• Introduction of Unit
	• File Handling – The file pointer, file accessing functions-fopen, fclose, putc, getc, fprintf, reading and writing into a file
	• Advance features- storage classes and dynamic memory allocation
	• C Preprocessor- #define, #include, #undef.
	• C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions.
	• Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Letus C, 6th Edition	Yashwant Kanitkar	PBP Publication	Letus C ,6th Edition
2.	The C programming Language	Richie and Kenninghan	BPBPublication,2004	The C programming Language
3.	Programming in ANSI C3rd Edition, 2005	E.Balagurusamy	Tata McGraw Hill	Programming in ANSIC 3rd Edition, 2005
Reference Book				
1.	The C programming Language Richie and Kenninghan PBP Publication,2004			
2.	Programming in ANSI C 3rd Edition, 2005 Balaguruswmy Tata McGraw Hill			
Online Resources				
1.	https://www.programiz.com/c-programming/examples			
2.	https://www.w3resource.com/c-programming-exercises			

Code: BTXCCV1103	Basics of Civil Engineering	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

The student will be able to:

CO1 Understand the importance and use of Engineering Materials

CO2 Apply the knowledge of material and elements in Building Construction.

CO3 Understand the importance of irrigation and water supply.

CO4 Apply the basic knowledge of mathematics and material to learn surveying and roads.

CO5 Understand the importance of Indian Standard Codes.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Civil Engineering Materials	8
2.	Introduction to Building Construction	8
3.	Irrigation and Water Supply	7
4.	Survey and Highway Engineering	8
5.	Introduction to Indian Standards Codes	7

B. **DETAILED SYLLABUS**

Unit	Unit Details
1.	**Civil Engineering Materials**
	• Traditional Material Introduction (Stones, Bricks, Lime, Cement, Timber) – Characteristics and their uses only • Mortar – Introduction, their Types (Cement Mortar, Lime Mortar, Mud Mortar, Special Mortar) and use. • Concrete – Introduction their Types (Plain Concrete, Reinforced Cement Concrete, Prestressed Concrete, Fiber Reinforced Concrete).
2.	**Introduction to Building Construction**
	• Introduction to Elements of Building • Foundation, their importance and their types. • Dampness and its Prevention. (Cause, ill effects and its solution).
3.	**Irrigation and Water Supply**
	• Definition and classification of irrigation – Irrigation structures – dams, weirs, cross drainage works, canal drops. Quality of water-Treatment methods
4.	**Survey and Highway Engineering**
	• Introduction to Surveying. • Instruments of Surveying and their uses, Linear Measurements, Insight to modern tools of Surveying (Auto Level, Theodolite, GPS) function only. • Introduction to Highway Engineering, Classification of Roads, Components of Highway, Super Elevation, Types of Pavements.
5.	**Introduction to Indian Standards Codes**
	• Introduction to IS codes for Building Deign (IS456:2000, IS800-2007, IS875 All Parts, IS1893:2016, IS13920)

C. **RECOMMENDED STUDY MATERIAL**

Sr.No	Reference Book	Author	Edition	Publication
1.	Basics of Civil Engineering	S.S. Bhavikatti	Latest	New Age International Publishers
2.	Basic Civil Engineering	B C Punmia, Ashok K Jain, Arun K Jain	Latest	Laxmi Publications
3.	Basic Civil Engineering	G K Hiraska	Latest	Dhanpat Rai Publication
4.	Basic Civil Engineering	Jhonson Victor D and Esther Malini	Latest	Allied Publishers Limited, Madras
5.	Basic Civil Engineering	Arunachalam N	Latest	Pratheeba Publishers, Coimbatore

Important Web Links	
1.	https://nptel.ac.in/courses/105106201
2.	https://onlinecourses.nptel.ac.in/noc20_ce02/preview

D. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	–	–	–	–	–	–	–	–
CO-2	2	3	1	2	–	–	–	–	–	–	–	–
CO-3	3	2	2	2	–	–	–	–	–	–	–	–
CO-4	3	3	1	2	–	–	–	–	–	–	–	–
CO-5	3	3	2	2	–	–	–	–	–	–	–	–

E. CO-PSO Mapping

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	1	–	3
CO-2	2	–	3
CO-3	1	–	3
CO-4	1	–	3
CO-5	2	–	3

Code: BTXCSA1105	Engineering Mathematics	3 Credits [LTP: 3-0-0]

COURSE OUTCOME
The student would be able:
CO1 To analyze and prove relationships between matrices, rank of matrix and systems of equations, Inverses.
CO2To analyze the basic structure of differential equations, and order and degree of the first order and first degree and its simple applications
CO3 To calculate asymptotes of different curves. They will be able to know fundamentals of tracing the various types of cures and asymptotes play a main role in tracing.
CO4To utilize methods of integration to evaluate volumes and surface of objects and lengths of curves.
CO5To apply vector differentiation, and integration in the scalar and vector fields

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	Matrices	7
2	Ordinary Differential Equations	8
3	Applications of Differential Calculus	8
4	Integral Calculus	8
5	Introduction Vector Calculus	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Matrices**
	• Introduction of Unit
	• Rank of a Matrix, Normal form of a Matrix
	• Consistency of systems of linear equations
	• Eigen Values and Eigen Vectors
	• Cayley-Hamilton Theorem (without proof)
	• Conclusion of Unit
2.	**Ordinary Differential Equations**
	• Introduction of Unit
	• First order and first-degree differential equations-Separable Variables,
	• Homogenous and reducible to homogenous equation
	• Linear Equation and reducible to linear form, Exact Equation
	• Linear differential equations with constant coefficients
	• Conclusion of Unit
3.	**Applications of Differential Calculus**
	• Introduction of Unit
	• Asymptotes
	• Multiple points
	• Curve tracing for standard Curves (Cartesian Curves only)
	• Conclusion & Real life applications
4.	**Integral Calculus**
	• Introduction of Unit
	• Gamma functions and their properties, beta function (only definition)
	• Double integrals, Double integral by changing into polar form, Areas by Double Integration
	• Change of order of integration
	• Conclusion of Unit
5.	**Vector Calculus**
	• Introduction of Unit
	• Scalar and Vector field
	• Differentiation and Integration of Vector functions
	• Gradient, Divergence and Curl, Directional derivatives
	• Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Higher Engineering Mathematics	B S Grewal	Latest	Khanna Publications, Delhi,
2.	Higher Engineering Mathematics	Ramana, B.V	Latest	Tata McGraw-Hill.
3	Engineering Mathematics: A Tutorial Approach	Ravish R Singh and M Bhatt	Latest	Tata McGraw-Hill
4	Calculus and Analytical Geometry	Thomas and Finney,	Latest	Narosa Publishing, New Delhi
5	Advanced Engineering Mathematics	Erwin Kreyszig	Latest	John Wiley and Sons
Important Web Links:				
1	https://nptel.ac.in/courses/111105134/			
2	https://nptel.ac.in/courses/122/101/122101001/			
3	https://www.classcentral.com/course/swayam-engineering-mathematics-i-13000			

D. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	3	1	1	—	—	—	—	—	—	—	—
CO-2	3	2	1	2	—	—	—	—	—	—	—	—
CO-3	2	3	2	1	—	—	—	—	—	—	—	—
CO-4	2	2	2	1	—	—	—	—	—	—	—	—
CO-5	2	3	1	1	—	—	—	—	—	—	—	—

E. CO-PSO Mapping

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	2	—	—
CO-2	2	—	—
CO-3	1	—	—
CO-4	2	—	—
CO-5	2	—	—

Code: BTXCSA1201	Basic Science lab	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES

Students will be able:

CO1: Learn the concept of interference by the help of Newton's ring & Michelson Interferometer

CO2: Learn the dispersive power of the material of the prism & resolving power of the telescope

CO3: To analyze hardness strength of Ferrous Ammonium sulphate solution and $CuSO_4$ solution.

CO4: To analyze hardness of water

CO5:To handle different instruments & analytical techniques

A. LISTOFEXPERIMENTS:

1	To determine the wavelength of sodium light by using Newton's Ring.
2	To determine the coherent length and coherent time by using He-Ne-Laser.
3	To measure the numerical aperture of an optical fiber by He-Ne laser.
4	To determine the wavelength of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
5	To specify the specific resistance of a material of a wire by carey Foster Bridge.
6	To determine the dispersive power of a prism for violet, yellow and red colour of mercery light with the help of spectrometer
7	To determine the strength of $CuSO_4$ solution with the help of hypo solution
8	To determine the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution using diphenyl amine as internal indicator
9	To determine the hardness of water by EDTA method.
10	Synthesis of Bakelite
11	To determine the viscosity of a given lubricating oil by Redwood viscometer
12	To determine the flash and fire point of a given lubricating oil

B. MAPPING OF COURSE OUTOCMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	-	-	2	-	-	-	-	-
CO2	2	3	3	1	-	-	2	-	-	-	-	-
CO3	3	2	2	3	-	-	2	-	-	-	-	-
CO4	2	1	1	2	-	-	2	-	-	-	-	-
CO5	3	1	2	1	-	-	2	-	-	-	-	-

C. MAPPING OF COURSE OUTOCMES WITH PROGRAMME SPECIFIC OUTCOMES

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	2	-	-
CO3	3	-	-
CO4	2	-	-
CO5	1	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BTXCCE1202	Programming in C Lab	3 Credits [LTP: 3-0-0]

COURSE OUTCOME: -

Students will be able to:

- Gain concept of functional hierarchical code organization.
- Work with textual information, characters and strings
- Implement file handling concepts
- Implement real time applications using the power of C language features.
- Overcome and solve possible errors during program execution.

A. LIST OF EXPERIMENTS:

1	Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x
2	Write a program that reads a floating point number and then displays the right-most digit of the integral part of the number.
3	Write a C program to calculate the sum of digits of given number.
4	Program to find largest and smallest number from four given number.
5	Program to find whether a year is leap or not
6	Write a C program in which enter any number by the user and perform the operation of Sum of digits of entered number.
7	Write a C Program to convert Decimal number to Binary number
8	Find the sum of this series upto n terms 1+2+3+4+5+6+………..
9	Program to print Armstrong's numbers from 1 to 100.
10	Write a program to convert years into Minute, Hours, Days, Months, Seconds using switch () statements
11	Write a C menu driven program
12	Write a program to generate the various pattern of numbers
13	Write a C Program to print the reverse of an integer number
14	Write a C program to perform the factorial of given number
15	Write a C program in which a function prime that returns 1 if its argument is a prime and return zero otherwise.
16	Write a C program to calculate factorial of a number using recursion.
17	Write a C program in which enter 10 elements by the user and perform the operation of sorting in ascending order
18	Write a C program to perform to perform Matrix addition and multiplication operations.
19	Write a program to determine the length of the string and find its equivalent ASCII codes.
20	Write a program to delete all the occurrences of the vowels in a given text. Assume that the text length will be of one line
21	Write a program to maintain the library record for 100 books with book name, author's name, and edition, year of publishing and price of the book.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
	Let us C	Yashwant Kanetkar	6th Edition	PBP Publication
	The C programming Language	Richie and Kenninghan	2nd Edition 2004	PBP Publication,2004
	Programming in ANSI C	E Balaguruswamy	3rd Edition, 2005	Tata McGraw Hill
Reference Book				
	The C programming Language by Richie and Kenninghan, PBP Publication,2004			
	Programming in ANSI C 3rd Edition, 2005 by E.Balagurusamy, Tata McGraw Hill			

Online Resources
https://www.programiz.com/c-programming/examples
https://www.w3resource.com/c-programming-exercises

MAPPING OF COURSE OUTOCMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	-	-	2	-	-	-	-	-
CO2	2	3	3	1	-	-	2	-	-	-	-	-
CO3	3	2	2	3	-	-	2	-	-	-	-	-
CO4	2	1	1	2	-	-	2	-	-	-	-	-
CO5	3	1	2	1	-	-	2	-	-	-	-	-

MAPPING OF COURSE OUTOCMES WITH PROGRAMME SPECIFIC OUTCOMES

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	2	-	-
CO3	3	-	-
CO4	2	-	-
CO5	1	-	-

| Code: BTXCCV1203 | Computer Aided Design (CADD) | 1Credits [LTP:0-0-1] |

COURSE OUTCOMES:-

Students will be able to:

CO1 Apply basic concepts to develop construction (drawing) techniques.

CO2 Analyze drawings through editing and plotting techniques

CO3 Apply basic tools to develop outlines in drawings.

CO4 Apply tools to control and manage the drawings in AutoCAD for different purposes

CO5 Create the layout of plans in workspace.

A. LIST OF EXPERIMENTS

1.	• Introduction to AutoCAD and Drawing Tools • Draw Different Shapes using Line, Polyline Circle, and Polygon.
2.	• Draw Different Shapes using Rectangle • Use of Dimensions in Circle, rectangles, Line and other shapes.
3.	• Modify Drawings in AutoCAD using Modification Tools. • Offset and Mirror Different Shapes and Lines.
4.	• Use Trim, Extend &Align, Scale and Strech Command.
5.	• Use of Text, Line, Block and Conversion Tools.
6.	• Introduction to Layers, How to add, Modify layers in layer manager.
7.	• Introduction of Hatch Command in AutoCAD
8.	• Opening and Modifying properties in AutoCAD.
9.	• Layout Design of Building
10.	• 2D Plan of Residential Structure

B. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	—	—	—	—	—	—	—	—
CO-2	2	3	1	2	—	—	—	—	—	—	—	—
CO-3	3	2	2	2	—	—	—	—	—	—	—	—
CO-4	3	3	1	2	—	—	—	—	—	—	—	—
CO-5	3	3	2	2	—	—	—	—	—	—	—	—

C. CO-PSO Mapping

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	1	—	3
CO-2	2	—	3
CO-3	1	—	3
CO-4	1	—	3
CO-5	2	—	3

COURSE OUTCOMES:-

Students will be able to:

CO1 Create a model of T Lap and T- Briddle Joint through carpentry shop

CO2 Analyze the making of prototype model through foundry shop

CO3 Analyze the difference between gas welding and arc welding and their applications

CO4 Create a model on fitting shop through filling, drilling and tapping operation

CO5 Analyze the difference between forging, moulding and casting

A. LIST OF EXPERIMENTS

1.	**Carpentry Shop**
	• Timber, definition, engineering applications, seasoning and preservation
	• Plywood and ply boards
2.	**Foundry Shop**
	• Moulding Sands, constituents and characteristics
	• Pattern, definition, materials types, core prints
	• Role of gate, runner, riser, core and chaplets
	• Causes and remedies of some common casting defects like blow holes, cavities, inclusions
3.	**Welding Shop**
	• Definition of welding, brazing and soldering processes and their applications
	• Oxyacetylene gas welding process, equipment and techniques, types of flames and their applications
	• Manual metal arc welding technique and equipment, AC and DC welding
	• Electrodes: Constituents and functions of electrode coating, welding positions
	• Types of welded joints, common welding defects such as cracks, undercutting, slag inclusion and boring
4.	**Fitting Shop**
	• Files, materials and classification.
5.	**Smithy Shop**
	• Forging, forging principle, materials
	• Operations like drawing, upsetting, bending and forge welding
	• Use of forged parts

B. List of Jobs to be made in the Workshop Practice

1.	**Carpentry Shop**
	1. T – Lap joint
	2. Bridle joint
2.	**Foundry Shop**
	3. Mould of any pattern
3.	**Welding Shop**
	4. Square butt joint by MMA welding
	5. Lap joint by MMA welding
4.	**Machine Shop Practice**
	6. Job on lathe with facing operation
	7. Job on lathe with one step turning and chamfering operations
	8. Job on shaper for finishing two sides of a job
5.	**Fitting Shop**
	9. Finishing of two sides of a square piece by filing
	10. Drilling operation on fitted job (two holes)
	11. Slotting operation on fitted job
	12. Tapping operation on fitted job

C. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	–	–	–	–	–	–	–	–
CO-2	2	3	1	2	–	–	–	–	–	–	–	–
CO-3	3	2	2	2	–	–	–	–	–	–	–	–
CO-4	3	3	1	2	–	–	–	–	–	–	–	–
CO-5	3	3	2	2	–	–	–	–	–	–	–	–

D. C0-PSO's

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	1	─	3
CO-2	2	─	3
CO-3	1	─	3
CO-4	1	─	3
CO-5	2	─	3

Code: BTXCME1106	Engineering Graphics	1 Credit [LTP: 1-0-2]

COURSE OUTCOME: -

Students will be able to:

CO1 Apply the concept of scale and their applications

CO2 Analyze the different applications of conic section and engineering curves and also how to draw on sheet

CO3 Analyze the use of projection and also analyze the difference between first and third angle projection method

CO4 Apply the concepts of sectioning, true section and apparent section and create the sectional views of the engineering components.

CO5 analyze the development of surface and analyze the sheet metal requirement for fabricating a surface.

A. List of Experiments

1.	• Lines, Lettering and Dimension (Sketch Book)
	• Scales: Representative Fraction, plain scales, diagonal scales, (In drawing sheet 1)
2.	• Conic Sections: Construction of ellipse, parabola and hyperbola by different methods(in drawing sheet) Engineering Curves: Construction of Cycloid, Epicycloids, Hypo-cycloid(in drawing sheet 2)
3.	• Type of Projection, Orthographic projection: first angle and third angle projection (in drawing sheet)
	• Projection of Points
	• Projection of Straight lines
	• Projection of planes: Different positions of plane lamina like: regular polygon, circle of three planes (four problems in drawing sheet)
	• Projection of Solids: Projection of right and regular polyhedron, cone (four problem in drawing sheet 3)
4.	• Orthographic Projections (3 Problems in drawing sheet 4)
5.	Sectional Views (2 Problems) and Riveted joints, lap joints, butt joints, chain riveting (drawing sheet 5)

B. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	–	–	–	–	–	–	–	–
CO-2	2	3	1	2	–	–	–	–	–	–	–	–
CO-3	3	2	2	2	–	–	–	–	–	–	–	–
CO-4	3	3	1	2	–	–	–	–	–	–	–	–
CO-5	3	3	2	2	–	–	–	–	–	–	–	–

C. CO-PSO Mapping

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	1	—	3
CO-2	2	—	3
CO-3	1	—	3
CO-4	1	—	3
CO-5	2	—	3

Code: BTXCEE1207	**Exploratory Project**	**1 Credits [LTP: 0-0-1]**

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1   Predict a problem of current relevance to society

CO2   Formulate the problem and identify suitable modelling paradigm

CO3   Categorize the problem and identify the solution methodology

CO4   Simulate and design systems using various modern tools

CO5   Validate the results and prepare a project report

GUIDELINES:

1. The Project group must complete project in all respect (assembly, testing, fabrication, tabulation, test result etc.)
2. The group should maintain a log book of activities. It should have entries related to the worked one, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in first term on or before the last day of the second term.
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. Assessment of the project forward of marks shall be done by the guide and a departmental committee.
7. The guide should be internal examiner for oral examination.
8. The external examiner should be from the related area of the concerned project. He should have experience at degree level / industry.
   The evaluation at final oral examination should be done jointly by the internal and external examiner.

Phases:

Project work is divided into the following phases:

Phase I

➢ Allocation of groups(Max. 4 Members & Min. 2 Members) & guide

➢ Black board presentation on topics as per the choice & feasibility

➢ Submission of abstract & synopsis of the project

Phase II

➢ Procurement of the components

➢ 2D/3D figure or model

➢ Paper work like any circuit diagram and tentative cost

Phase III

➢ Working Model of the project

➢ Mounting the components

➢ Final hardware evaluation/presentation

➢ Submission of the final hardware to the coordinator.

Phase V

➢ Final report submission (after project exhibition)

➢ Paper presentation on the selected project in seminars /conferences/journals

➢ Viva voce

Deadlines of Phases:

The Project will be covered in 13 weeks from starting of semester. The time allocated to each phase is as follow:

Phase -1:   Maximum 2 weeks

Phase -2:   Maximum 3 weeks

Phase -3:   Maximum 6 weeks

Phase- 4:   Maximum 2 weeks

Distribution of Marks:-

Total Marks 100

Break up of marks (100)

Performance of Phase 1   :15

Performance of Phase 2   :20

Performance of Phase 3   :20

Performance of Phase 4   :45

Total   :**100**

Note: 1. Performance marks of Phase 1/2/3/4 will be given by Coordinators, Guide and external (if any) on completion of the respective phase.

2. Presentation and demonstration will be taken by Project Coordinator, Guide.

3. Guide feedback will be collected by Project Coordinator.

		POORNIMA UNIVERSITY, JAIPUR							
		Faculty of Engineering and Technology							
		Name of Program: B.Tech. in Civil Engineering		**Duration: 4 Years**			**Total Credits: 174**		
		Teaching Scheme for Batch 2023-27							
		Semester-II							
		Teaching Scheme				**Marks Distribution**			**Cre dits**
Course Code	**Name of Course**	**Lecture (L)**	**Tutorial (T)**	**Practical (P)**	**SH**	**IE**	**ESE**	**Total**	
A.		**Major (Core Courses)**							
A.1	**Theory**								
BTXCCE2101	Python	3	-	-	2*	40	60	100	3
BTXCCV2102/ BTXCEE2103	Basic of Civil Engineering / Basics of Electrical and Electronics Engineering	3	-	-	1+1*	40	60	100	3
BTXCSA2104/ BTXCME2105	Engineering Mathematics / Basic of Mechanical Engineering	3	-	-	1+1*	40	60	100	3
A.2	**Practical**								
BTXCCE2201	Programming in Python Lab	-	-	2		60	40	100	1
BTXCCV2202/ BTXCEE2203	Computer Aided Design (CADD)/ Basics of Electrical and Electronics Engineering Lab	-	-	2		60	40	100	1
BTXCME1205/ BTXCME1206	Workshop Practice/Engineering Graphics	-	-	2		60	40	100	1
BTXCCE1207	Exploratory Project	-	-	2	2*	60	40	100	1
B.		Minor Stream Courses/ **Department Electives**							
B.1	**Theory (Any One)**								
BTXECE2111 BTXECE2112 BTXECE2113 BTXECE2114 BTXEME2116 BTXECE2115	• Introduction to AI&DS • Introduction to Cyber Security • Introduction to Cloud • Introduction to Game Tech. • Engineering Mechanics • Digital Electronics	3	-	-		40	60	100	3
B.2	**Practical**								
C		**Multidisciplinary Courses**							
BTXEBX2109	MOOC Course-I (Human Behaviour)	2	0	0					2
D		**Ability Enhancement Courses (AEC)**							
BULCHU2204	Language Lab	0	0	2		60	40	100	1
E		**Skill Enhancement Courses (SEC)**							
BULCSE2201	Skill Enhancement Generic Course-II	-	-	2		60	40	100	1
F		**Value Added Courses (VAC)**							
BUVCPH2102	Health Behaviour & Communication	2	-	-		40	60	100	2
G		**Summer Internship / Research Project / Dissertation**							
		-	-	-					
	Total	16	-	12	2/2+6*				**22**
	Total Teaching Hours	**30/36**							

SH: Supporting Hours
*Classes will be conducted fortnightly.

Code: BTXCCE2101	Python Programming	3 Credits [LTP: 3-0-0]

COURSE OUTCOME:
Students will be able to:
- Understand the basic terminology used in computer programming to write, compile and debug programs in Python programming language.
- Use different data types to design programs involving decisions, loops, and functions for problem solving
- Apply various object oriented programming
- Handle the exceptions which are raised during the execution of Python scripts
- Implement files and classes in the Python programming environment

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Introduction to Python Programming**	**07**
2.	**Python Operators and Control Flow statements**	**09**
3.	**Data Structures, Python Functions and Packages**	**09**
4.	**Object Oriented Programming**	**08**
5.	**File I/O Handling and Exception Handling**	**09**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Python Programming**
	• Introduction to Unit • What is Python, • Uses of Python Programming Language / Python Applications • Features of Python Programming Language • Python-2 and Python-3 differences • Python environment setup — Installation and working of IDE • Running Simple Python scripts to display 'welcome' message. • Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of data types • Python building blocks — Identifiers, Keywords, Indention, Variables, Comments • Conclusion of unit
2.	**Python Operators and Control Flow statements**
	• Introduction to Unit • Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise, Membership, Identity operators, Python Operator Precedence • Control Flow: • Conditional Statements (if, if ... else, nested if) • Looping in python (while loop, for loop, nested loops) • Conclusion of Unit
3.	**Data Structures, Python Functions and Packages**
	• Introduction to Unit • Lists, Tuple, Sets, Dictionaries • String and Slicing • Use of Python built • User defined functions and its types • Command-line Arguments • Using standard packages (e.g. math, scipy, Numpy, pandas etc.) • Conclusion of Unit

4.	**Object Oriented Programming**
	• Introduction of Unit
	• Creating Classes and Objects
	• Inheritance
	• Method Overloading and Overriding
	• Data Hiding
	• Types of Methods : Instance Methods , Static Methods , Class Methods
	• Accessing attributes , Built-In Class Attributes
	• Conclusion of Unit
5.	**File I/O Handling andException Handling**
	• Introduction of Unit
	• Types of File
	• File Objects, File Built-in Function, File Built-in Methods
	• File Built-in Attributes
	• Read/write operations Reading Text
	• Errors in Python : Compile-Time Errors ,Runtime Errors , Logical Errors
	• try….except…else, try-finally clause
	• Regular expressions
	• Conclusion of Unit

C.   RECOMMENDED STUDY MATERIAL:

S. No	Text Books:	Author	Edition	Publication
1.	Core Python Programming	Chun, JWesley	2007	Pearson,
2.	Head First Python	Barry,Paul	2010	ORielly,
Reference Book				
1	Learning Python Lutz, Mark O Rielly, 2009			
Online Resources				
1	https://www.learnpython.org/			
2	https://realpython.com/start-here/			
3	https://www.programiz.com/python-programming			

D. CO-PO Mapping

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	-	-	2	-	-	-	-	-
CO2	2	3	3	1	-	-	2	-	-	-	-	-
CO3	3	2	2	3	-	-	2	-	-	-	-	-
CO4	2	1	1	2	-	-	2	-	-	-	-	-
CO5	3	1	2	1	-	-	2	-	-	-	-	-

E. CO-PSO Mapping

COs and PSO's	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	2	-	-
CO3	3	-	-
CO4	2	-	-
CO5	1	-	-

BTXCCV2102	BASICS OF CIVIL ENGINEERING	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

The student will be able to:

CO1 Understand the importance and use of Engineering Materials

CO2 Apply the knowledge of material and elements in Building Construction.

CO3 Understand the importance of irrigation and water supply.

CO4 Apply the basic knowledge of mathematics and material to learn surveying and roads.

CO5 Understand the importance of Indian Standard Codes.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Civil Engineering Materials**	**8**
2.	**Introduction to Building Construction**	**8**
3.	**Irrigation and Water Supply**	**7**
4.	**Survey and Highway Engineering**	**8**
5.	**Introduction to Indian Standards Codes**	**7**

B. DETAILED SYLLABUS

Unit	Unit Details
6.	**Civil Engineering Materials**
	• Traditional Material Introduction (Stones, Bricks, Lime, Cement, Timber) – Characteristics and their uses only
	• Mortar – Introduction, their Types (Cement Mortar, Lime Mortar, Mud Mortar, Special Mortar) and use.
	• Concrete – Introduction their Types (Plain Concrete, Reinforced Cement Concrete, Prestressed Concrete, Fiber Reinforced Concrete).
7.	**Introduction to Building Construction**
	• Introduction to Elements of Building
	• Foundation, their importance and their types.
	• Dampness and its Prevention. (Cause, ill effects and its solution).
8.	**Irrigation and Water Supply**
	• Definition and classification of irrigation – Irrigation structures – dams, weirs, cross drainage works, canal drops. Quality of water-Treatment methods
9.	**Survey and Highway Engineering**
	• Introduction to Surveying.
	• Instruments of Surveying and their uses, Linear Measurements, Insight to modern tools of Surveying (Auto Level, Theodolite, GPS) function only.
	• Introduction to Highway Engineering, Classification of Roads, Components of Highway, Super Elevation, Types of Pavements.
10.	**Introduction to Indian Standards Codes**
	• Introduction to IS codes for Building Deign (IS456:2000, IS800-2007, IS875 All Parts, IS1893:2016, IS13920)

C. RECOMMENDED STUDY MATERIAL

Sr.No	Reference Book	Author	Edition	Publication
6.	Basics of Civil Engineering	S.S. Bhavikatti	Latest	New Age International Publishers
7.	Basic Civil Engineering	B C Punmia, Ashok K Jain, Arun K Jain	Latest	Laxmi Publications
8.	Basic Civil Engineering	G K Hiraska	Latest	Dhanpat Rai Publication
9.	Basic Civil Engineering	Jhonson Victor D and Esther Malini	Latest	Allied Publishers Limited, Madras
10.	Basic Civil Engineering	Arunachalam N	Latest	Pratheeba Publishers, Coimbatore
Important Web Links				
3.	https://nptel.ac.in/courses/105106201			
4.	https://onlinecourses.nptel.ac.in/noc20_ce02/preview			

D. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	—	—	—	—	—	—	—	—
CO-2	2	3	1	2	—	—	—	—	—	—	—	—
CO-3	3	2	2	2	—	—	—	—	—	—	—	—
CO-4	3	3	1	2	—	—	—	—	—	—	—	—
CO-5	3	3	2	2	—	—	—	—	—	—	—	—

E. CO-PSO Mapping

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	1	—	3
CO-2	2	—	3
CO-3	1	—	3
CO-4	1	—	3
CO-5	2	—	3

Code: BTXCSA2105	Engineering Mathematics	3 Credits [LTP: 3-0-0]

A. COURSE OUTCOME

The student would be able:

CO1 To analyze and prove relationships between matrices, rank of matrix and systems of equations, Inverses.

CO2 To analyze the basic structure of differential equations, and order and degree of the first order and first degree and its simple applications

CO3 To calculate asymptotes of different curves. They will be able to know fundamentals of tracing the various types of cures and asymptotes play a main role in tracing.

CO4 To utilize methods of integration to evaluate volumes and surface of objects and lengths of curves.

CO5 To apply vector differentiation, and integration in the scalar and vector fields

B. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	Matrices	7
2	Ordinary Differential Equations	8
3	Applications of Differential Calculus	8
4	Integral Calculus	8
5	Introduction Vector Calculus	8

C. DETAILED SYLLABUS

Unit	Unit Details
1.	**Matrices**
	• Introduction of Unit
	• Rank of a Matrix, Normal form of a Matrix
	• Consistency of systems of linear equations
	• Eigen Values and Eigen Vectors
	• Cayley-Hamilton Theorem (without proof)
	• Conclusion of Unit
2.	**Ordinary Differential Equations**
	• Introduction of Unit
	• First order and first-degree differential equations-Separable Variables,
	• Homogenous and reducible to homogenous equation
	• Linear Equation and reducible to linear form, Exact Equation
	• Linear differential equations with constant coefficients
	• Conclusion of Unit
3.	**Applications of Differential Calculus**
	• Introduction of Unit
	• Asymptotes
	• Multiple points
	• Curve tracing for standard Curves (Cartesian Curves only)
	• Conclusion & Real life applications
4.	**Integral Calculus**
	• Introduction of Unit
	• Gamma functions and their properties, beta function (only definition)
	• Double integrals, Double integral by changing into polar form, Areas by Double Integration
	• Change of order of integration
	• Conclusion of Unit
5.	**Vector Calculus**
	• Introduction of Unit
	• Scalar and Vector field
	• Differentiation and Integration of Vector functions
	• Gradient, Divergence and Curl, Directional derivatives
	• Conclusion of Unit

D. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Higher Engineering Mathematics	B S Grewal	Latest	Khanna Publications, Delhi,
2.	Higher Engineering Mathematics	Ramana, B.V	Latest	Tata McGraw-Hill.
3	Engineering Mathematics: A Tutorial Approach	Ravish R Singh and M Bhatt	Latest	Tata McGraw-Hill
4	Calculus and Analytical Geometry	Thomas and Finney,	Latest	Narosa Publishing, New Delhi
5	Advanced Engineering Mathematics	Erwin Kreyszig	Latest	John Wiley and Sons
Important Web Links:				
1	https://nptel.ac.in/courses/111105134/			
2	https://nptel.ac.in/courses/122/101/122101001/			
3	https://www.classcentral.com/course/swayam-engineering-mathematics-i-13000			

E. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	3	1	1	—	—	—	—	—	—	—	—
CO-2	3	2	1	2	—	—	—	—	—	—	—	—
CO-3	2	3	2	1	—	—	—	—	—	—	—	—
CO-4	2	2	2	1	—	—	—	—	—	—	—	—
CO-5	2	3	1	1	—	—	—	—	—	—	—	—

F. CO-PSO Mapping

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	2	—	—
CO-2	2	—	—
CO-3	1	—	—
CO-4	2	—	—
CO-5	2	—	—

COURSE OUTCOMES

The student will be able to:

CO1 Understand why Python is a useful scripting language for developers.

CO2 Identify the key issues in Python code, develop and experiment with python programming.

CO3 Develop problem solving and critical thinking skills in fundamental enable techniques like conditionals and loops.

CO4 Construct and explain with structure and concept of different data type like, List and Dictionary.

CO5 Implement read and write data from/to files in Python Develop Python programs step-wise by defining functions with tinker.
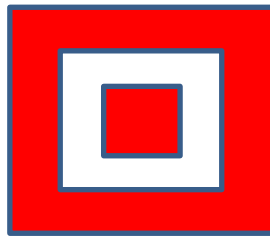
A. **List of Programs:**

Part A
1. Write and run a Python program that outputs the value of each of the following expressions: 5.0/9.0 5.0/9 5/9.0 5/9 9.0/5.0 9.0/5 9/5.0 9/5 Based on your results, what is the rule for arithmetic operators when integers and floating point numbers are used? 2. Write and run a Python program that asks the user for a temperature in Celsius and converts and outputs the temperature in Fahrenheit. (Use the formula given in the example above and solve for tempFin terms of tempC.) 3. Here is an algorithm to print out n! (n factorial) from 0! to 19!: 1. Set f = 1 2. Set n = 0 3. Repeat the following 20 times: a. Output n, "! = ", f b. Add 1 to n c. Multiply f by n Using a for loop, write and run a Python program for this algorithm. 4. Modify the program above using a `while` loop so it prints out all of the factorial values that are less than 1 billion. 5. Modify the first program so it finds the minimum in the array instead of the maximum. 6. (Harder) Modify the first program so that it finds the **index** of the maximum in the array rather than the maximum itself.
Part B
7. Modify the bubble sort program so it implements the improvements discussed in class. (HINT: To exit the main loop if the array is already sorted, simply change the loop variable to equal the last value so the loop ends early.) 8. Draw the Target symbol (a set of concentric Squares, alternating red and white) in a graphics window that is 200 pixels wide by 200 pixels high. Hint: Draw the largest circle first in red, then draw the next smaller circle in white, then draw the next smaller circle in red. Graphical objects drawn later appear "on top of" graphical objects drawn earlier.

9. Try entering the following literal values at the prompt. (Hit ENTER after each)
   -5
   -4.2
   4.5
   4.14
   0.90
   Something odd should occur. *Describe it on paper.*
10. Create a 5 X 5 rectangle whose top left corner is at (*row**5, *col**5). (Where is the bottom right corner?) If the sum of the *row* and *col* numbers is even, set the fill color of the rectangle to white, otherwise set it to black. Then draw the rectangle.

B. **RECOMMENDED STUDY MATERIAL:**

S. No	Text Books:	Author	Edition	Publication
1.	Core Python Programming	Chun, JWesley	2007	Pearson,
2.	Head First Python	Barry,Paul	2010	Orielly,
Reference Book				
1	Learning Python Lutz, Mark O Rielly, 2009			
Online Resources				
1	https://www.learnpython.org/			
2	https://realpython.com/start-here/			
3	https://www.programiz.com/python-programming			

C. **CO-PO Mapping**

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	1	2	-	-	2	–	–	–	–	–
CO-2	2	3	3	1	-	-	2	–	–	–	–	–
CO-3	3	2	2	3	-	-	2	–	–	–	–	–
CO-4	2	1	1	2	-	-	2	–	–	–	–	–
CO-5	3	1	2	1	-	-	2	–	–	–	–	–

D. CO-PSO Mapping

CO-PSO	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	2	-	-
CO3	3	-	-
CO4	2	-	-
CO5	1	-	-

COURSE OUTCOMES:-

Students will be able to:

CO1 Apply basic concepts to develop construction (drawing) techniques.

CO2 Analyze drawings through editing and plotting techniques

CO3 Apply basic tools to develop outlines in drawings.

CO4 Apply tools to control and manage the drawings in AutoCAD for different purposes

CO5 Create the layout of plans in workspace.

A. **LIST OF EXPERIMENTS**

1	• **Introduction to AutoCAD and Drawing Tools**
2	• Draw Different Shapes using Line, Polyline Circle, and Polygon.
3	• Draw Different Shapes using Rectangle
4	• Use of Dimensions in Circle, rectangles, Line and other shapes.
5	• Modify Drawings in AutoCAD using Modification Tools.
6	• Offset and Mirror Different Shapes and Lines.
7	• .Use Trim, Extend &Align, Scale and Strech Command.
8	• Use of Text, Line, Block and Conversion Tools.
9	• Introduction to layers, how to add, modify layers in layer manager.
10	• Introduction of hatch command in autocad
11	• Opening and modifying properties in autocad.
12	• Layout design of building
13	• 2d Plan Of Residential Structure

B. **CO-PO Mapping**

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	—	—	—	—				
CO-2	2	3	1	2	—	—	—	—				
CO-3	3	2	2	2	—	—	—	—				
CO-4	3	3	1	2	—	—	—	—				
CO-5	3	3	2	2	—	—	—	—				

C. **CO-PSO Mapping**

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	1	─	3
CO-2	2	─	3
CO-3	1	─	3
CO-4	1	─	3
CO-5	2	─	3

COURSE OUTCOMES:-

Students will be able to:

CO1 Create a model of T Lap and T- Briddle Joint through carpentry shop

CO2 Analyze the making of prototype model through foundry shop

CO3 Analyze the difference between gas welding and arc welding and their applications

CO4 Create a model on fitting shop through filling, drilling and tapping operation

CO5 Analyze the difference between forging, moulding and casting

A. LIST OF EXPERIMENTS

1	**Carpentry Shop**
	• Timber, definition, engineering applications, seasoning and preservation
	• Plywood and ply boards
2	**Foundry Shop**
	• Moulding Sands, constituents and characteristics
	• Pattern, definition, materials types, core prints
	• Role of gate, runner, riser, core and chaplets
	• Causes and remedies of some common casting defects like blow holes, cavities, inclusions
3	**Welding Shop**
	• Definition of welding, brazing and soldering processes and their applications
	• Oxyacetylene gas welding process, equipment and techniques, types of flames and their applications
	• Manual metal arc welding technique and equipment, AC and DC welding
	• Electrodes: Constituents and functions of electrode coating, welding positions
	• Types of welded joints, common welding defects such as cracks, undercutting, slag inclusion and boring
4	**Fitting Shop**
	• Files, materials and classification.
5	**Smithy Shop**
	• Forging, forging principle, materials
	• Operations like drawing, upsetting, bending and forge welding
	• Use of forged parts

List of Jobs to be made in the Workshop Practice

1.	**Carpentry Shop**
	13. T – Lap joint
	14. Bridle joint
2.	**Foundry Shop**
	15. Mould of any pattern
3.	**Welding Shop**
	16. Square butt joint by MMA welding
	17. Lap joint by MMA welding
4.	**Machine Shop Practice**
	18. Job on lathe with facing operation
	19. Job on lathe with one step turning and chamfering operations
	20. Job on shaper for finishing two sides of a job
5.	**Fitting Shop**
	21. Finishing of two sides of a square piece by filing
	22. Drilling operation on fitted job (two holes)
	23. Slotting operation on fitted job
	24. Tapping operation on fitted job

B. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	—	—	—	—	—	—	—	—
CO-2	2	3	1	2	—	—	—	—	—	—	—	—
CO-3	3	2	2	2	—	—	—	—	—	—	—	—
CO-4	3	3	1	2	—	—	—	—	—	—	—	—
CO-5	3	3	2	2	—	—	—	—	—	—	—	—

C. CO-PSOs Mapping

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	1	—	3
CO-2	2	—	3
CO-3	1	—	3
CO-4	1	—	3
CO-5	2	—	3

Code: BTXCME1106	Engineering Graphics	1 Credit [LTP: 1-0-2]

COURSE OUTCOME: -

Students will be able to:

CO1 Apply the concept of scale and their applications

CO2 Analyze the different applications of conic section and engineering curves and also how to draw on sheet

CO3 Analyze the use of projection and also analyze the difference between first and third angle projection method

CO4 Apply the concepts of sectioning, true section and apparent section and create the sectional views of the engineering components.

CO5 analyze the development of surface and analyze the sheet metal requirement for fabricating a surface.

A. List of Experiments

1.	• Lines, Lettering and Dimension (Sketch Book) • Scales: Representative Fraction, plain scales, diagonal scales, (In drawing sheet 1)
2.	• Conic Sections: Construction of ellipse, parabola and hyperbola by different methods(in drawing sheet) Engineering Curves: Construction of Cycloid, Epicycloids, Hypo-cycloid(in drawing sheet 2)
3.	• Type of Projection, Orthographic projection: first angle and third angle projection (in drawing sheet) • Projection of Points • Projection of Straight lines • Projection of planes: Different positions of plane lamina like: regular polygon, circle of three planes (four problems in drawing sheet) • Projection of Solids: Projection of right and regular polyhedron, cone (four problem in drawing sheet 3)
4.	• Orthographic Projections (3 Problems in drawing sheet 4)
5.	Sectional Views (2 Problems) and Riveted joints, lap joints, butt joints, chain riveting (drawing sheet 5)

B. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	–	–	–	–	–	–	–	–
CO-2	2	3	1	2	–	–	–	–	–	–	–	–
CO-3	3	2	2	2	–	–	–	–	–	–	–	–
CO-4	3	3	1	2	–	–	–	–	–	–	–	–
CO-5	3	3	2	2	–	–	–	–	–	–	–	–

C. CO-PSO Mapping

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	1	–	3
CO-2	2	–	3
CO-3	1	–	3
CO-4	1	–	3
CO-5	2	–	3

Code: BTXCEE1207	**Exploratory Project**	**1 Credits [LTP: 0-0-1]**

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1   Predict a problem of current relevance to society

CO2   Formulate the problem and identify suitable modelling paradigm

CO3   Categorize the problem and identify the solution methodology

CO4   Simulate and design systems using various modern tools

CO5   Validate the results and prepare a project report

GUIDELINES:

9. The Project group must complete project in all respect (assembly, testing, fabrication, tabulation, test result etc.)

10. The group should maintain a log book of activities. It should have entries related to the worked one, problems faced, solution evolved etc., duly signed by guide.

11. The guides should regularly monitor the progress of the project work.

12. The project work along with project report should be submitted as part of term work in first term on or before the last day of the second term.

13. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.

14. Assessment of the project forward of marks shall be done by the guide and a departmental committee.

15. The guide should be internal examiner for oral examination.

16. The external examiner should be from the related area of the concerned project. He should have experience at degree level / industry.

    The evaluation at final oral examination should be done jointly by the internal and external examiner.

Phases:

Project work is divided into the following phases:

Phase I

➢ Allocation of groups(Max. 4 Members & Min. 2 Members) & guide

➢ Black board presentation on topics as per the choice & feasibility

➢ Submission of abstract & synopsis of the project

Phase II

➢ Procurement of the components

➢ 2D/3D figure or model

➢ Paper work like any circuit diagram and tentative cost

Phase III

➢ Working Model of the project

➢ Mounting the components

➢ Final hardware evaluation/presentation

➢ Submission of the final hardware to the coordinator.

Phase V

➢ Final report submission (after project exhibition)

➢ Paper presentation on the selected project in seminars /conferences/journals

➢ Viva voce

Deadlines of Phases:

The Project will be covered in 13 weeks from starting of semester. The time allocated to each phase is as follow:

Phase -1:   Maximum 2 weeks

Phase -2:   Maximum 3 weeks

Phase -3:   Maximum 6 weeks

Phase- 4:   Maximum 2 weeks

Distribution of Marks:-

Total Marks 100

Break up of marks (100)

Performance of Phase 1   :15

Performance of Phase 2   :20

Performance of Phase 3   :20

Performance of Phase 4   :45
_____

Total   :**100**

Note: 1. Performance marks of Phase 1/2/3/4 will be given by Coordinators, Guide and external (if any) on completion of the respective phase.

2. Presentation and demonstration will be taken by Project Coordinator, Guide.

3. Guide feedback will be collected by Project Coordinator.

Code: BTXECE2111	Introduction to Artificial Intelligence	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Analyze various agents in AI
- Apply Search techniques to solve problem
- Solve the Constraint Satisfaction Problems using AI methods
- Implement Adversarial Search in Game Playing
- Solve real world problems using AI techniques

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Artificial Intelligence**	**07**
2.	**Problem solving by Search**	**08**
3.	**Constraint Satisfaction Problems**	**07**
4.	**Software Agents**	**07**
5.	**AI applications**	**07**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Artificial Intelligence**
	• Introduction to Artificial Intelligence • Definition of Artificial Intelligence • A brief history of Artificial Intelligence • Why do we study AI? • What is AI? • Views of AI: Acting Humanly, Thinking Humanly, Thinking Rationally and Acting Rationally • Areas of AI • Agents and environments • PEAS (Performance measure, Environment, Actuators, Sensors) • Environment types • Agent types: Simple reflex agents, Model-based reflex agents, Goal-based agents and Utility-based agents • Examples of Agent • Conclusion of the Unit
2.	**Problem solving by Search**
	• Introduction of Unit • Problem-solving agents • Problem formulation • Example problems: 8-Puzzle problem and 8-queens problem • Basic search algorithms • Un-informed search strategies: Breadth-first search, Depth-first search, Depth-limited search, Uniform-cost search and Iterative deepening search • Informed Search Algorithms: Best-first search, Greedy best-first search, A* search, Hill-climbing search, and Genetic algorithms • Conclusion of the Unit

3.	**Constraint Satisfaction Problems**
	• Introduction to Constraint Satisfaction Problems (CSP)
	• Why do we need to consider CSPs?
	• Constraint Propagation
	• CSP Vs Search problems
	• Real-world CSPs
	• Finite vs. Infinite CSP
	• CSP as a Search Problem : Backtracking search for CSPs, Forward checking for CSPs and Local search for CSPs
	• Conclusion of the Unit
4.	**Adversarial Search and Game Playing**
	• Introduction to Adversarial Search and Game Playing
	• Games: Definition, Search vs. Games and Game Tree
	• Optimal decisions in Games: Mini max algorithm and α-β pruning with example
	• Imperfect, real-time decisions
	• Partially Observable Games
	• State-of-the-Art Game Programs: Chess on Deep Blue, Chess on standard PCs, Checkers on Chinook and Backgammon: TD-Gammon
	• Conclusion of the Unit
5.	**AI Applications**
	• Introduction of Unit
	• Language Models
	• Information Retrieval, Extraction
	• Natural Language Processing
	• Machine Translation
	• Speech Recognition
	• Expert system: Introduction, phases, architecture, Expert system Vs Traditional system
	• Robot, Hardware , Planning, Moving
	• Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Artificial Intelligence: A Modern Approach	S. Russell and P. Norvig	Third Edition	Prentice Hall
2.	Prolog: Programming for Artificial Intelligence	I. Bratko	Fourth edition	Addison-Wesley Educational Publishers Inc
Reference Book				
1.	Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, M. Tim Jones.			
2.	The Quest for Artificial Intelligence, Cambridge University Press, Nils J. Nilsson.			
3.	Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, William F. Clocksin and Christopher S. Mellish.			
4.	Multi Agent Systems, Second Edition, MIT Press, Gerhard Weiss.			
5.	Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, David L. Poole and Alan K. Mackworth.			
Online Resources				
1.	https://onlinecourses.nptel.ac.in/noc21_ge20/preview			
2.	https://www.coursera.org/learn/introduction-to-ai			
3.	https://www.javatpoint.com/artificial-intelligence-tutorial			

D. CO-PO Mapping

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	1	2	2	-		—	—	—	—	—
CO-2	2	3	3	1	-	-	2	—	—	—	—	—
CO-3	3	2	2	3	2	-		—	—	—	—	—
CO-4	2	1	1	2	-	-	2	—	—	—	—	—
CO-5	3	1	2	1	-	-	2	—	—	—	—	—

E. CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	2	-	-
CO3	3	-	-
CO4	2	-	-
CO5	1	-	-

COURSE OUTCOME

Students will be able to:
- Know basic concepts and importance of information security and cryptography.
- Recognize the business need for information security.
- Gain knowledge about advance cryptographic algorithms and Identify security issues and objectives in computer systems and networks.
- Learn about cryptographic key management.
- Know how message digests are used in authentication.

A.   OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	**Introduction to Information Security**	8
2	**The Need for IT Security – I**	8
3	**Advance Algorithms and Techniques**	8
4	**Key Management**	8
5	**Cryptography in User Authentication**	7

B.   DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Information Security**
	● Introduction of Unit ● Definition of Information Security, Evolution of Information Security; Basics Principles of Information Security; Critical Concepts of Information Security; Components of the Information System ● Overview of Cryptography (What is Cryptography, Principles of Cryptography Techniques) ● Understanding Mono-Alphabet Substitution Cryptographic Algorithms (Caesar Cipher, Stream Cipher) ● Understanding Multi-Alphabet Substitution Cryptographic Algorithms (Simple substitution, Polyalphabetic substitution) ● Conclusion of the Unit
2.	**The Need for IT Security – I**
	● Introduction of Unit ● Business Needs-Protecting the functionality ● Enabling the safe operations ● Protecting the data, safe guarding the technology assets ● Conclusion of the Unit
3.	**Advance Algorithms and Techniques**
	● Introduction of Unit ● Understanding Birthday Attack (What is Birthday Paradox, how to avoid it) ● Asymmetric Key Algorithms and types (RSA, Diffie-Hellman key exchange, DSA) ● Conclusion of the Unit Attacks-Malicious Codes, Back Doors, Denial of Service and Distributed Denial of Service, Spoofing, sniffing, Spam, Social Engineering ● Conclusion of the Unit
4.	**Key Management**
	● Introduction of Unit ● The basic functions involved in key management including creation ● Distribution, verification, revocation and destruction, ● Storage, recovery and life span and how these functions affect cryptographic integrity ● Conclusion of the Unit

5.	Cryptography in User Authentication
	● Introduction of Unit
	● Basics of authentication, tokens,
	● Certificate-based and biometric authentication,
	● Extensible authentication protocols, and message digest, Security handshake
	● Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Publication
1	Cryptography and Network Security	Atul Kahate	McGraw Hill India, 2017
2	Cryptography and Network Security	S. Bose	Pearson India , 2016
3	Information security: Principles and Practice	Mark Stamp	John Wiley & Sons, Inc., 2011

Reference Book	
1.	Security in Computing, Fourth Edition, by Charles P. P fleeger, Pearson Education
2.	Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson
3	Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall.
Online Resources	
1.	https://www.sans.org/cyber-security-courses/introduction-cyber-security/
2.	https://nptel.ac.in/courses/106106129

D. CO-PO MAPPING

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	1	2	2	-		—	—	—	—	—
CO-2	2	3	3	1	-	-	2	—	—	—	—	—
CO-3	3	2	2	3	2	-		—	—	—	—	—
CO-4	2	1	1	2	-	-	2	—	—	—	—	—
CO-5	3	1	2	1	-	-	2	—	—	—	—	—

E. CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	2	-	-
CO3	3	-	-
CO4	2	-	-
CO5	1	-	-

COURSE OUTCOME:
Students will be able to:

- Explain the core concepts of the cloud computing paradigm
- Learn the underlying principles of Cloud Technology and various types of cloud
- Computing architecture and types.
- Learn to evaluate between different cloud solutions offered by various providers based on their merits and demerits.
- Apply fundamental concepts in cloud infrastructures to understand the tradeoffs in power, efficiency and cost.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

A. OUTLINF OF THE COURSE

Un it	Title of the unit	Time required for the Unit (Hours)
1	**Introduction**	7
2	**Cloud Computing Companies and Migrating to Cloud**	8
3	**Cloud Cost Management and Selection of Cloud Provider**	8
4	**Governance in the Cloud**	8
5	**Ten cloud do's and do not's**	8

B.   DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction**
	● Introduction to Unit ● Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private and Public clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, Practical applications of cloud computing, Cloud computing delivery models and services (IaaS, PaaS, SaaS) ● Obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, ● Practical applications of cloud computing ● Conclusion of the Unit
2.	**Cloud Computing Companies and Migrating to Cloud**
	● Introduction to Unit ● Web-based business services, Delivering Business Processes from the Cloud: Business process examples, ● Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud ● Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies ● Conclusion of the Unit

3.	**Cloud Cost Management and Selection of Cloud Provider**
	● Introduction to Unit ● Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost- benefit analysis, selecting the right scalable application. ● Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration ● Conclusion of the Unit
4.	**Governance in the Cloud**
	● Introduction to Unit ● Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing ● Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration ● Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations ● Conclusion of the Unit
5	**Ten cloud do's and do not's**
	● Introduction to Unit ● Don't be reactive ● do consider the cloud a financial issue ● don't go alone ● do think about your architecture ● don't neglect governance ● don't forget about business purpose ● do make security the centerpiece of your strategy ● don't apply the cloud to everything don't forget about Service Management ● do start with a pilot project ● Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Text / Reference Book	Author	Publication
1	Cloud Computing: Principles and Paradigms	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski	John Wiley and Sons Publications, 2011
2	Brief Guide to Cloud Computing	Christopher Barnett	Constable & Robinson Limited, 2010
3	Handbook on Cloud Computing	Borivoje Furht, Armando Escalante, Springer	2010
4	Cloud Computing Theory and Practice	Dan C Marinescu, Elsevier	2013
5	Cloud Computing for Dummies	Judith Hurwitz, Robin Bloor, Marcia Kaufman & Fern Halper	Wiley Publishing, 2010

D. CO-PO MAPPING

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	1	2	2	-		—	—	—	—	—
CO-2	2	3	3	1	-	-	2	—	—	—	—	—
CO-3	3	2	2	3	2	-		—	—	—	—	—
CO-4	2	1	1	2	-	-	2	—	—	—	—	—
CO-5	3	1	2	1	-	-	2	—	—	—	—	—

E. CO-PSO MAPPING

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	1	-	-
CO3	3	-	-
CO4	2	-	-
CO5	2	-	-

COURSE OUTCOME

Student will able to

- Comprehend the critical importance of Game Technology
- Use learned skills to solve problems of various layouts
- Recognize what is the role each hardware component of a PC plays in games and in making games
- Conduct independent work in entertainment software engineering context.
- Work as a productive member and as part of a team developing larger entertainment software product.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Gaming Technology**	**07**
2.	**History of Gaming Hardware**	**08**
3.	**Input devices**	**08**
4.	**Functions of a GPU in games**	**07**
5.	**Role of a CPU in games**	**07**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Gaming Technology**
	• Introduction of Unit • Basics of processes and models applied in the entertainment software industry • Basics of the game development tools • Introduction to game engines and their functions • Basics of 3D objects • Introduction to game development-related programming problem. • Basics of artificial intelligence in entertainment software engineering context. • Basics of sound engineering • Gamification and Serious games • Basic principles of AR and VR development • Conclusion of unit
2.	**History of Gaming Hardware**
	• Introduction of Unit • Console architecture over the decades • Evolution of input devices in games along with their design changes • analysis of hardware generations of consoles - with a brief overview of Gen 1-4 devices a • A broader look at some significant consoles of Gen 5-8 • Conclusion of Unit
3.	**Input devices**
	• Introduction of Unit • Types and variations of input devices (touch devices, controllers, keyboards, and mice) • How these devices work • Taking multiple types of inputs from these devices • Working on input • Adding support for these devices in your games – • challenges of building/designing an input device (ergonomics, abstraction vs immersion) • Conclusion of Unit

4.	Functions of a GPU in games
	• Introduction of Unit • Introduction to graphics APIs • commonly used APIs • Working of APIs in GPU Programming) • Shaders • Lighting Techniques (Ray tracing, ray-casting) • Difference between an API and an SDK • Conclusion of Unit
5.	Role of a CPU in games
	• Introduction of Unit • multi-threading • hyper-threading, • multi-core CPUs • parallel processing – • Need of multi-threading in games • Function of CPU in games • collision detection • pathfinding, • Realtime object tracking • Conclusion of Unit

C.   RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Advanced Game Development with Programmable Graphics Hardware	Alan Watt, Fabio Policarpo	April 2005	A K Peters Ltd
2.	Unity 5 Game Optimization	Chris Dickinson	Nov 2015	O' Riley Media
Reference Book				
3.	Evan Amos, 'The Game Console: A Photographic History from Atari to Xbox', No Starch Press, November 2018, ISBN 978-1593277437			
Online Resources				
4.	https://www.edx.org/learn/game-development tps://learnui.design/			
5.	https://files.eric.ed.gov/fulltext/EJ1090277.pdf			

D.   CO-PO MAPPING

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	1	2	2	-		—	—	—	—	—
CO-2	2	3	3	1	-	-	2	—	—	—	—	—
CO-3	3	2	2	3	2	-		—	—	—	—	—
CO-4	2	1	1	2	-	-	2	—	—	—	—	—
CO-5	3	1	2	1	-	-	2	—	—	—	—	—

E. CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3
CO1	2	-	-
CO2	2	-	-
CO3	3	-	-
CO4	3	-	-
CO5	1	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BTXECE2115	Digital Electronics	3 Credits [LTP: 3-0-0]

Course Outcomes: -

Students will be able to:

    CO1.   Verify and interpret truth tables for all logic gates.

CO2. Design of decoders and multiplexer.
CO3. Use various flip-flops in digital circuits
CO4. Apply registers and counters in digital circuits.
CO5. Do conversion from A/D and D/A convertors.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Number System and Logic Gates**	**7**
2.	**Decoders, Multiplexers & De-Multiplexers**	**6**
3.	**Flip-Flops**	**7**
4.	**Registers And Counters**	**8**
5.	**Memories And Converters**	**8**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Number System and Logic Gates**
	• **Introduction to number systems** – Binary to decimal conversion – Decimal to binary conversion –Octal numbers – Hexadecimal numbers • **Logic gates** – NOT, OR, AND – Universal NAND and NOR gates – EX-OR and EX-NOR gates – DeMorgan's Theorems — 1's complement – 2's complement – Adders (half & full) – Subtractor (half & full). • Conclusion of the Unit
2.	**Decoders, Multiplexers & De-Multiplexers**
	• Introduction of Unit • Basic functions and block diagram of Encoders and decoders. • Basic functions and block diagram of Multiplexers and De-Multiplexers, Different types and ICs. • 4 bit decoder circuits for 7 segment display and other applications. • Conclusion of the Unit.
3.	**Flip-Flops**

	• Introduction of Unit
	    • J-K Flip-Flop
	    • R-S Flip-Flop
	    • D-Type Flip-Flop
	    • T-Type Flip-Flop
	    • Applications of Flip-Flops
	• Conclusion of the Unit

4.	**Registers And Counters**

	• Introduction to Shift Register
	    • Introduction and basic concepts including shift left and shift right.
	    • Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.
	    • Introduction to Counters (Asynchronous and Synchronous counters)
	    • Binary up/down counters (upto MOD-8)
	    • Ring counter with timing diagram
	• Conclusion of the Unit

5.	**Memories And Converters**
	• Introduction of Unit • *Memories* – ROM, RAM, EPROM, EEPROM – Volatile and non-volatile – Static and dynamic RAM. • **Analog to digital converters** – Parallel Comparator A/D converter – Dual slope converter –Successive approximation method – Counter type converter. • **Digital to analog converters** – Binary weighted D/A converter – R/2R ladder network converter • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Digital Principles and Applications	Donald P Leach, Malvino	-	McGraw Hill
2.	Modern Digital Electronics	RP Jain	-	Tata McGraw Hill
3.	Digital Fundamentals	Floyd and Jain	-	Pearsons Education
Reference Book				
3.	Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi			
4.	Digital Electronics and Applications by Malvino Leach, Tata McGraw Hill Education Pvt Ltd, New Delhi			
Online Resources				
3.	https://archive.nptel.ac.in/courses/108/105/108105132/			
4.	https://onlinecourses.nptel.ac.in/noc22_ee55/preview			

D. MAPPING OF CO VS PO

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	1	2	2	-		—	—	—	—	—
CO-2	2	3	3	1	-	-	2	—	—	—	—	—
CO-3	3	2	2	3	2	-		—	—	—	—	—
CO-4	2	1	1	2	-	-	2	—	—	—	—	—
CO-5	3	1	2	1	-	-	2	—	—	—	—	—

E. CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3
CO1	2	-	-
CO2	2	-	-
CO3	3	-	-
CO4	3	-	-
CO5	1	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BTXEME2116	ENGINEERING MECHANICS	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

The student will be able to:

CO1 Analyze the forces act on a component and method of resolution.

CO2 Evaluate centroid and center of gravity of an object and also analyze how to minimize the effort for lifting a load.

CO3 Evaluate the effect of friction and also evaluate forces with the effect of friction.

CO4 Analyze the conversion of linear motion into angular motion and vice versa.

CO5 Analyze the effect of impact on elastic and non-elastic body.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Fundamentals of Mechanics**	**8**
2.	**Machine & Moment of Inertia**	**8**
3.	**Friction & Belt Drive**	**7**
4.	**Dynamics of Particles**	**8**
5.	**Work, Power & Impact**	**8**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Fundamentals of Mechanics**
	- Introduction of Unit - Fundamental laws of mechanics, Principle of transmissibility. - System of forces, Resultant force, Resolution of force. - Moment and Couples, Varignon's Theorem, - Equilibrium, Conditions for equilibrium, Lami's theorem. - Conclusion of Unit
2.	**Machine & Moment of Inertia**
	- Introduction of Unit - Lifting Machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines – System of Pulleys. - Centroid & Moment of Inertia: Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section- I, L, C and H. - Conclusion of Unit
3.	**Friction & Belt Drive**
	- Introduction of Unit - Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Numericals on Ladder. - Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives. - Conclusion of Unit
4.	**Dynamics of Particles**
	- Introduction of Unit - Kinematics of Particles and Rigid Bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration. - Kinetics of Particles and Rigid Bodies: Newton's laws, Linear Momentum, Equation of motion in rectangular coordinate, Equation of motion in plane for a rigid body, D' Alembert principle. - Conclusion of Unit

5.	Work, Power & Impact
	• Introduction of Unit
	• Work, Energy and Power: Work of a force, weight, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy.
	• Impact: Collision of elastic bodies, types of impact, conservation of momentum, Newton's law of collision.
	• Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

Sr.No	Reference Book	Author	Edition	Publication
1.	Vector Mechanics for Engineers	Beer and Johnston	Latest	Tata McGraw Hill
2.	Engineering Mechanics	D S Kumar	Latest	S K Kataria& Sons
3.	Engineering Mechanics Statics	Meriam, J. L. & Kraige, L. G	Latest	John Wiley & Son
4.	Engineering Mechanics	S. Ramamruthan	Latest	Dhanpat Rai Pub.
5.	Engineering Mechanics	Shames	Latest	Pearson Education
Important Web Links				
1.	https://nptel.ac.in/courses/112103109/			
2.	https://nptel.ac.in/courses/112106286/			
3.	https://freevideolectures.com/course/2264/engineering-mechanics			

D. CO-PO MAPPING

COs and POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	–	–		—	—	—	—	—
CO-2	2	3	1	2	–	–	2	—	—	—	—	—
CO-3	3	2	2	2	–	–		—	—	—	—	—
CO-4	3	3	1	2	–	–	2	—	—	—	—	—
CO-5	3	3	2	2	–	–	2	—	—	—	—	—

E. CO-PSO MAPPING

COs and PSOs	PSO-1	PSO-2	PSO-3
CO-1	1	—	3
CO-2	2	—	3
CO-3	1	—	3
CO-4	1	—	3
CO-5	2	—	3

Faculty of Engineering and Technology

Name of Program: B. Tech. Civil Engineering   Duration: 4 Years   Total Credits: 174

Teaching Scheme for Batch 2023-27

Course Code	Name of Course	Semester-III							
		Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	
A.	Major (Core Courses)								
A.1	**Theory**								
BCVCSA3101	Engineering Mathematics - II	3	0	0	1*	40	60	100	3
BCVCCV3102	Fluid Mechanics	3	0	0	1*	40	60	100	3
BCVCCV3103	Strength of Material	3	0	0	1*	40	60	100	3
A.2	**Practical**								
BCVCCV3201	Fluid Mechanics Lab	0	0	2		60	40	100	1
BCVCCV3202	Material Testing Lab	0	0	2		60	40	100	1
BCVCCV3203	Structure Drawing Lab	0	0	2		60	40	100	1
BCVCCV3204	Technical Seminar	0	0	2	2*	60	40	100	1
BCVCCV3205	Engineering Geology Lab	0	0	2		60	40	100	1
B.	Minor Stream Courses / **Department Electives**								
B.1	**Theory (Any one)**								
BCVECV3111	Building Material & Construction	3	0	0	1*	40	60	100	3
BCVECV3112	Sustainable Construction								
BCVECV3113	Building By laws								
B.2	**Practical**								
	-								
C	Multidisciplinary Courses								
	MOOC Course-II (Human Behaviour)	2	0	0					2
D	Ability Enhancement Courses (AEC)								
BULCHU3106	Interpersonal Communication & Grooming	0	0	2		40	60	100	2
E	Skill Enhancement Courses (SEC)								
BULCSE3201	Skill Enhancement Generic Course-III	0	0	2		60	40	100	1
F	Value Added Courses (VAC)								
BUVCCE3101	Digital Marketing	2	0	0		40	60	100	2
G	Summer Internship / Research Project / Dissertation								
	-	16		14	6*				24
Total Teaching Hours		**30/36**							

SH: Supporting Hours
*Classes will be conducted fortnightly.

| Code: BCVCSA3101 | ENGINEERING MATHEMATICS –II | 3Credits [LTP: 3-0-0] |

COURSE OUTCOMES: After Successful completion of the course students will be able to:

CO1	Analyze different numerical methods which can be used for the solution of non-linear problems.
CO2	Analyze application of numerical methods, statistical concepts and linear algebra for solving different engineering problems.
CO3	Know the usage of an adequate scientific language to formulate the basic concepts of the course.
CO4	Apply the fundamental concepts of Ordinary Differential Equations and Partial Differential Equations and the basic numerical methods for their resolution.
CO5	Gain the knowledge of ordinary and partial differential equations and their application in Civil Engineering.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Approximation & Error Analysis	**9**
2.	Linear Algebraic Equation	**9**
3.	Interpolation	**10**
4.	Numerical Integration	**10**
5.	Ordinary & Partial Differential Equation	**10**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Approximation & Error Analysis**
	• Introduction • Approximation & Error analysis • Approximations and round of errors • Truncation errors and Taylor Series • Roots of Non-linear Equations • Determination of roots of polynomials and transcendental equations by Bisection, Secantand Bairstow's method • Newton-Raphson method • Successive substitution method.
2.	**Linear Algebraic Equation**
	• Introduction • Linear Algebraic Equation • Solutions of linear simultaneous linear algebraic equations by Gauss Elimination andGauss- Siedel iteration methods • LU Decomposition methods.

3.	Interpolation			
	- Introduction - Interpolation - Newton Forward interpolation - Newton Backward Interpolation - Stirling formula - Lagrange's Formula - Numerical Differentiation (Upto First derivative) - Curve fitting- Fitting of Straight Line, fitting of Parabola.			
4.	Numerical Integration			
	- Introduction - Numerical Integration - Trapezoidal method - Simpson's 1/3 method - Simpson's 3/8 method - Applications of Numerical Integration in finding Area under the curve.			
5.	Ordinary & Partial Differential Equation			
	- Introduction - Ordinary Differential Equation - Numerical solution of ordinary differential equations by Euler, Modified Euler, Runga-Kutta and Milne's Predictor-Corrector method. - Partial Differential Equation: Elliptic equation & parabolic equation & their solution techniques. - Finite Element Method: General approach and concept.			

A. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publications
1.	Numerical Methods and Statistical Techniques using 'C'	Manish Goyal	Latest	Laxmi Publications
2.	Numerical Methods for Engineers and Scientists	Jain- Iyenger-Jain	Latest	New Age Publications
3.	Advanced Engineering Mathematics	B S Grewal	Latest	Khanna Publications
4.	Numerical Methods with programming in C	T Veerarajan	Latest	(TMH)
Websites				
https://nptel.ac.in/courses/122107036/ https://nptel.ac.in/courses/122104017/ https://nptel.ac.in/courses/111107127/ https://nptel.ac.in/courses/111107119/ https://nptel.ac.in/courses/111105035/				

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	1	-	3	1	-	-	-	-	-	1	-
CO.2	1	3	-	2	1	-	-	-	-	-	-	-
CO.3	1	-	-	3	1	-	-	-	-	-	1	-
CO.4	1	1	3	-	-	-	1	-	-	-	1	-
CO.5	1	1	3	-	1	1	-	-	-	-	-	1

C. COs AND PSOs MAPPING

COs andPSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	1	2	3	1	-
CO.2	-	2	2	-	3
CO.3	1	1	-	3	2
CO.4	1	3	-	2	-
CO.5	1	3	-	2	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

Code: BCVCCV3102	FLUID MECHANICS	3 Credits [LTP: 3-0-0]

COURSE OUTCOME: After Successful completion of the course students will be able to:

CO1: Differentiate among ideal, real, Newtonian and non-Newtonian types of fluid based on Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.

CO2: Apply absolute, gauge and atmospheric pressures at a point in a static fluid, equilibrium condition and stability concept for floating bodies.

CO3: Derive velocity, discharge and shear stress of laminar and turbulent flow of fluid.

CO4: Apply Bernoulli and momentum equations on pitot tube, orifice meter, venturimeter, notches, weirs and mouthpiece to measure discharge and velocity.

CO5: Evaluate between laminar and turbulent flow through pipes based on Reynold's number, friction factor and losses.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit(Hours)
1.	Fluids & Its Properties	7
2.	Hydrostatics & Buoyancy	11
3.	Hydro – Kinematics	11
4.	Bernoulli's Theorem, Momentum Equation & its Application	10
5.	Flow through Pipes	9

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Fluids & Its Properties**
	- Introduction - Definition - Ideal fluids, real fluids - Newtonian and non-Newtonian fluids - Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.
2.	**Hydrostatics & Buoyancy**
	- Introduction - Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure - Manometers Bourdon pressure gauge. - Forces acting on immersed plane surface. - Centre of pressure, forces on curved surfaces. - Conditions of equilibrium for floating bodies, meta-center and metacentric height experimental and analytical determination of metacentric height.

3.	**Hydro – Kinematics**
	• Introduction
	• Fluid mass subjected to horizontal and vertical acceleration and uniform rotation.
	• Types of Flows : Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes
	• Principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective,
	• Rotational and irrational motions, free and forced vortex, circulation and vorticity velocity potential and stream function, elementary treatment of flow net.
	• Euler's equations of motion and integration of Euler's equations
	• Bernoulli's equation for incompressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.
4.	Bernoulli's Theorem, Momentum Equation & its Application
	• Introduction
	• Pitot tube, Venturimeter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches
	• Francis formula. Velocity of approach.
	• End contractions Cippoletti Weir, time of emptying reservoirs by weirs.
	• Development of momentum equation by control volume concept,
	• Momentum correction factor, applications – Borda's mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles.
5.	Flow through Pipes
	• Introduction
	• Laminar flow, Reynolds experiment, transition from laminar to turbulent flow.
	• Turbulent Flow: Laws of fluid friction, friction factor Moody's diagram, loss of head due to friction and other causes.
	• Hydraulic gradient, total energy line Chezy's, Darcy's and Manning's formula, flow through parallel pipes and pipes in series, flow through branched pipes.
	• Flow along a by-pass
	• Power transmission through pipe, condition for maximum power.
	• Elementary water hammer concept.

C. RECOMMENDED STUDY MATERIAL:

S .No	Reference Book	Author	Edition	Publisher
1.	Fluid Mechanics	Modi& Seth	22nd	STANDARD BOOK HOUSE;
2.	Fluid Mechanics	D.S. Kumar	Latest	S.K. Kataria & Sons;
3.	Fluid Mechanics	R.K. Bansal	Latest	Laxmi Publications; (2018)
4.	Fluid Mechanics	Frank M White	Latest	McGraw Hill Education India Private Limited; Eighth edition
5.	Fluid Mechanics	R.K. Rajput	Latest	S Chand & Company

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	1	1	-	-	2	1	-	-	-	-	1
CO.2	1	1	2	1	1	-	1	-	-	-	-	-
CO.3	1	1	3	1	1	-	-	-	1	-	-	-
CO.4	1	1	3	-	-	-	1	-	1	1	1	-
CO.5	1	1	3	-	1	1	-	-	-	-	-	1

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	3	-	-	1
CO.2	1	3	-	2	1
CO.3	3	1	1	1	-
CO.4	3	2	2	-	-
CO.5	3	2	-	-	2

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

Code: BCVCCV3103	STRENGTH OF MATERIAL	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO-1   Evaluate stresses and strains in prismatic and non-prismatic members.

CO-2   Analyze the compound stresses on elements in 1-D, 2-D and 3-D and stresses on the column using Euler's, Rankine's and Secant's Formula.

CO-3   Demonstrate the centroid and moment of inertia of symmetrical and un-symmetrical section.

CO-4   Derive the formula for bending of beams and trusses based on types of supports, determinacy and stability.

CO-5   Analyze the theories of simple bending for simple and composite section.

A. **OUTLINE OF THE COURSE**

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Simple Stresses & Strains	8
2.	Compound Stress & Columns	6
3.	Centroid & Moment of Inertia	6
4.	Bending of Beams and Plane Trusses	8
5.	Theory of Simple Bending	8

B. **DETAILED SYLLABUS**

Unit	Unit Details
1.	**Simple Stresses & Strains**
	• Introduction, Concept of stress and strain in three dimensions and generalized Hooke's law, Direct stress and strain: free body diagrams, Hooke's law, Young's modulus, Tension test of mild steel and other materials: true and apparent stress, ultimate strength, yield stress and permissible stress, Stresses in prismatic & non prismatic members and in composite members • Thermal stresses, Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress, Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants, Strain energy for gradually applied, suddenly applied and impact loads.
2.	**Compound Stress & Columns**
	• Introduction, Two dimensional stress systems: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle & its application. Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads • Euler's theory and its limitation, concept of effective length of columns; Rankine's & Secant formulae.
3.	**Centroid & Moment of Inertia**
	• Introduction, First moment of area, Centroid and moment of inertia of symmetrical & unsymmetrical sections, radius of gyration, polar moment of inertia, product moment of inertia, parallel axis theorem, principal axes and principal moment of inertia.

4.	**Bending of Beams and Plane Trusses**
	• Introduction, Types of supports, support reactions, determinate and indeterminate structures, static stability of plane structures; Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected to various types of loads and moments. Simple
	pin jointed trusses and their analysis: method of joints, method of section.
5.	**Theory of Simple Bending**
	• Introduction, Distribution of bending and shear stresses for simple and composite sections; Shear center and its location in flanged sections.
	• Introduction to unsymmetrical bending.

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Edition
1.	Strength of Materials: Mechanics of Solids	R.S. Khurmi	Latest	S.Chand
2.	A Text book of Strength of Materials: Mechanics of Solids	R.K Bansal	Latest	Laxmi Publications
3.	Elements of Strength of Materials	Timoshenko & Young	Latest	CBS publishers
4.	Mechanics of Materials	B.C.Punmia, A.K.Jain	Latest	Laxmi Publications
5.	Strength of Materials	S Ramamurtham	Latest	DhanpatRai Publishing Company (P) Ltd
6.	Mechanics of Materials (SI Units)	R.C. Hibbler	Latest	Pearson Education
Websites				

https://nptel.ac.in/courses/112107146/ https://nptel.ac.in/courses/105105108/
https://nptel.ac.in/content/syllabus_pdf/105105108.pdf
https://nptel.ac.in/courses/112101095/
https://swayam.gov.in/nd1_noc19_ce18/preview
http://www.nptelvideos.in/2012/11/strength-of-materials-prof.html

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	1	-	-	-	-	-	-	-	-	-
CO.2	2	2	1	2	-	-	-	-	-	-	-	-
CO.3	2	3	-	1	-	-	-	-	-	-	-	-
CO.4	2	-	3	-	1	-	-	-	-	-	-	-
CO.5	2	2	2	1	-	-	-	-	-	-	-	-

E. **COs AND PSOs MAPPING**

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3	-	2	-	1
CO.2	2	3	-	1	-
CO.3	1	2	3	1	-
CO.4	-	2	2	-	3
CO.5	1	1	-	3	2

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1	Demonstrate the basic properties and characteristics of incompressible fluid in the laboratory.
CO2	Demonstrate fundamental theorems governing fluid flows i.e. continuity, energy and momentum in the laboratory.
CO3	Able to measure different fluid properties using various types of equipment like measurement of flow, pressure velocity and head loss.
CO4	Determine various coefficients of mouthpiece.
CO5	Know about the working principles of orifice meter, venturimeter, and mouthpiece.

A. LIST OF EXPERIMENT:

1.	To Verify the Bernoulli's Theorem
2.	To study the variation of Reynolds Number.
3.	To determine air flow using orifice meter
4.	Determination of Metacentric Height
5.	To determine the minor losses.
6.	To determine the friction factor and major losses.
7.	To determine the C_d, C_v and C_c for the mouthpiece
8.	To determine the Coefficient of discharge of a V – notch.
9.	To determine the Speed of fluid using Pitot tube
10.	To Determine the viscosity of given fluid using Stoke's Law.

B. VIRTUAL LABS

http://fm-nitk.vlabs.ac.in/#

http://eerc03-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	2	2	2	-	-	-	-	-	-	-	-	-
CO.3	2	-	2	3	-	-	-	-	-	-	-	-
CO.4	2	-	2	-	-	2	-	-	-	-	-	-
CO.5	2	2	1	-	1	-	-	-	-	-	-	-

D. COs AND PSOs MAPPING

Cos and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	3	1	-	-
CO.2	3	3	-	-	-
CO.3	3	2	1	-	-
CO.4	2	-	1	-	-
CO.5	2	2	-	3	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1   Analyze young Modulus and hardness of given specimens.

CO2   Evaluate impact value and crushing value of coarse aggregates.

CO3   Evaluate the compressive strength of concrete cubes and bricks.

CO4   Analyze stiffness of open coiled and closed coiled springs, physical properties of given coarse aggregate, fine aggregate and cement samples.

CO5   Analyze and perform different test for tensile strength for given material.

A. LIST OF EXPERIMENTS:

1.	To determine tensile strength of Mild Steel & HYSD Bars.
2.	To find out compressive strength of Bricks
3.	To determine compressive strength of Wooden Blocks
4.	To determine hardness of given specimen using Rockwell Hardness Test
5.	To determine hardness of given specimen using Brinell Hardness Test
6.	To find out impact strength by IZOD test
7.	To find out impact strength by Charpy test
8.	To find out fatigue strength by Fatigue Test
9.	To determine characteristics of given Spring
10.	To determine torsional strength of given specimen
11.	To determine compressive strength for Precast Tile blocks

B. VIRTUAL LABS

http://sm-nitk.vlabs.ac.in/#

http://eerc01-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering

C. COs AND POs MAPPING

LOs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	**1**	-	-	**3**	-	-	-	-	-	-	-
CO.2	2	**2**	-	-	**3**	-	-	-	-		-	-
CO.3	1	**2**	**2**	-	**1**	-	-	-	-	-	-	-
CO.4	2	**2**	-	-	**2**	-	-	-	-	-	-	-
CO.5	**2**	-	**2**	-	**2**	-	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3	3	-	-	-
CO.2	2	3	1	-	-
CO.3	3	3	-	-	-
CO.4	3	2	1	-	-
CO.5	3	3	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1 Analyze young Modulus and hardness of given specimens.

CO2 Evaluate impact value and crushing value of coarse aggregates.

CO3 Evaluate the compressive strength of concrete cubes and bricks.

CO4 Analyze stiffness of open coiled and closed coiled springs, physical properties of given coarse aggregate, fine aggregate and cement samples.

CO5 Analyze and perform different test for tensile strength for given material.

A. LIST OF EXPERIMENTS:

1.	To determine tensile strength of Mild Steel & HYSD Bars.
2.	To find out compressive strength of Bricks
3.	To determine compressive strength of Wooden Blocks
4.	To determine hardness of given specimen using Rockwell Hardness Test
5.	To determine hardness of given specimen using Brinell Hardness Test
6.	To find out impact strength by IZOD test
7.	To find out impact strength by Charpy test
8.	To find out fatigue strength by Fatigue Test
9.	To determine characteristics of given Spring
10.	To determine torsional strength of given specimen
11.	To determine compressive strength for Precast Tile blocks

B. VIRTUAL LABS

C. http://sl-iitr.vlabs.ac.in/index.php?section=List%20of%20experiments

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	1	-	-	3	-	-	-	-	-	-	-
CO.2	2	2	-	-	3	-	-	-	-	-	-	-
CO.3	1	2	2	-	1	-	-	-	-	-	-	-
CO.4	2	2	-	-	2	-	-	-	-	-	-	-
CO.5	2	-	2	-	2	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3	3	-	-	-
CO.2	2	3	1	-	-
CO.3	3	3	-	-	-
CO.4	3	2	1	-	-
CO.5	3	3	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

Code: BCVCCV3204	TECHNICAL SEMINAR	1 Credits [LTP: 0-0-2]

1. For seminar every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic at the end of term.

2. Selection of topic should be done by students in consultation with concerned guide

a). Topic should be related to branch but it should be extended part of the branch (latest and advance topic).

b). The topic should be such that the student can gain latest knowledge. Student should preferably refer at least one research paper

3. Seminar topic should not be repeated in the department and registration of the same should be done on first come first served basis.

4. Seminar report should be submitted in paper bound copy prepared with computer typing

a). Size of report depends on advancement of topic.

b). Student should preferably refer minimum 5 reference books / magazines.

c). Format of content i. Introduction. ii. Literature survey. iii. Theory 1) Implementation 2) Methodology

3) Application 4) Advantages, Disadvantages. iv. Future scope. v. Conclusion.

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1 Evaluate the geology: Branches and Scope of Geology and the concepts of various geological materials and weathering processes.

CO2 Analyze and evaluate the properties, behavior and engineering significance of different type of rocks and minerals.

CO3 Interpret and analyze different type of geological features: Fold, Fault, Joints and Unconformities.

CO4 Relate and evaluate Geophysical methods for Subsurface Analysis and understand the site selection parameters for Dam& Tunnel

CO5 Create and evaluate the basic concept of remote sensing & GIS in various fields of Civil Engineering.

A. List of Experiment

1. Study of physical properties and identification of rock forming minerals referred under theory.
2. Study of physical properties and identification of economic minerals referred under theory.
3. Megascopic and microscopic identification of rocks & minerals
4. Megascopic and microscopic description and identification of igneous rocks referred under theory.
5. Megascopic and microscopic description and identification of sedimentary rocks referred under theory.
6. Megascopic and microscopic description and identification of metamorphic rocks referred under theory.
7. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
8. Geological cross sections and study of geological maps
9. Simple Structural Geology problems
10. Simple strike and Dip problems
11. Study of models of geological structures and out crops patterns of different types of rocks and land forms

B. VIRTUAL LABS

http://sm-nitk.vlabs.ac.in/#

http://eerc01-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	1	2	-	-	-	1	-	-	-	-	1
CO.2	2	1	2	-	1	-	-	-	-	-	-	2
CO.3	-	3	-	2	-	-	-	-	-	1	-	-
CO.4	1	1	-	2	1	-	-	-	-	1	-	-
CO.5	-	1	-	2	1	-	-	-	-	1	-	1

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	1	1	2	2
CO.2	2	1	1	2	1
CO.3	3	2	-	1	-
CO.4	1	1	3	1	-
CO.5	-	-	-	2	3

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

Code: BCVECV3111	**BUILDING MATERIAL & CONSTRUCTION**	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

CO1 To learn the various building materials and their utilization in construction.

CO2 To learn the various building materials and their utilization in construction.

CO3 To learn standardized techniques used to evaluate construction materials performance.

CO4 To understand the various types of masonry works, causes and effects of dampness, various damp proofing methods.

CO5 To understand and utilize basic principles used in building construction.

A. **OUTLINE OF THE COURSE**

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Stones & Bricks	8
2.	Lime and Timber	6
3.	Cement, Concrete and Masonry	6
4.	Building Component and technology	8
5.	Construction Technology	8

B. **DETAILED SYLLABUS**

Unit	Unit Details
1.	**Stones & Bricks**
	• **Stones:** General, Qualities of a good building stone, Deterioration of stones, Preservation of stones, Common building stones of India & their Uses, Artificial stones. • **Bricks:** General, Constituents of bricks, desirable and harmful ingredients in brick earth, qualities of good bricks, testing of bricks, strength, Absorption, weathering of bricks. Varietiesof fire bricks, sand lime bricks, building tiles- roofing; flooring and wall tiles.
2.	**Lime and Timber**
	• **Lime:** Cementing material, Characteristics of good quality lime, classification & testing of Lime, Hydraulic test, acid test, setting & slaking of lime, uses of different varieties of lime. • **Timber:** Advantages of timber construction, timber trees- exogenous and endogenous trees; soft and hard woods, structure of tree, felling of trees, defects in timber, characteristics ofgood timber, uses and testing of timber.
3.	**Cement, Concrete and Masonry**
	• **Cement and Concrete:** Constituents of concrete, different types of cements used and their strengths, Ingredients and manufacture of cements. Hydration and compounds of hydration. Properties and various tests of cement. • **Brick & Stone Masonry:** Terms used; types of bonds; their merits and demerits; Rubble and ashlar joints in stone masonry, introduction to cement concrete hollow blocks.

4.	**Building Component and technology**
	• **Walls and Foundation:** Load bearing and non-load bearing walls, estimation of load on walls and footings, Thickness considerations, partition and cavity walls.
	• **Damp Proofing:** Sources, Causes of dampness in buildings, bad effects of dampness, methods of damp proofing.
	• **Plastering, Pointing and Painting:** Introduction, objects and types, special materials for plastered surfaces, distempering, white washing and color washing of plastered surfaces.
5.	**Construction Technology**
	• **Arches and Lintels:** Introduction to terms used in Arches; different types of arches; brick and stone arches, types and functions of lintels.
	• **Doors and Windows:** Introduction terms used location of doors and windows, types of doors and windows, Ventilators
	• **Floors:** Introduction, various types of floors commonly used and their suitability for different buildings, anti- termite treatment.

C. **RECOMMENDED STUDY MATERIAL:**

S. No.	Reference Book	Author	Edition	Edition
1.	Building Materials	P. C. Varghese	Latest	Prentice Hall India Learning Private Limited
2.	Building Construction and Materials	Rangwala	Latest	Charotar Publishing House Pvt. Ltd.
3.	Building Construction and Materials	Gurcharan Singh	Latest	Standard Book House
4.	Building Construction	Sushil Kumar	Latest	Standard Publisher Dist.
5.	Building Construction	B. C. Punamia	Latest	Laxmi Publications
6.	Building Construction	S.P. Bindra, S.P. Arora	Latest	DhanpatRai Publications

Websites:

http://www.nptelvideos.in/2012/11/building-materials-and-construction.html
https://nptel.ac.in/content/syllabus_pdf/105102088.pdf
https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330
https://nptel.ac.in/courses/105102088/

D. **COs AND POs MAPPING**

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	2	1	-	-	-	-	-	-	-
CO.2	3	-	-	-	2	-	-	-	-	-	-	-
CO.3	3	-	-	-	1	-	-	-	-	-	-	1
CO.4	3	-	-	-	-	1	-	-	-	-	-	-
CO.5	2	-	1	-	2	-	-	-	-	-	-	-

E. **COs AND PSOs MAPPING**

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	-	-	1	3
CO.2	2	-	-	1	3
CO.3	2	-	-	1	3
CO.4	3	-	-	2	1
CO.5	3	-	-	2	1

Code: BCVECV3112	SUSTAINABLE CONSTRUCTION	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

CO1   Understand the relevance and the concept of sustainability and the global initiatives in this direction.

CO2   Explain the different types of environmental pollution problems and their sustainable solutions.

CO3   Discuss the environmental regulations and standards.

CO4
           Outline the concepts related to conventional and non-conventional energy

CO5   Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge andprinciples.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Sustainability	6
2.	Pollution	6
3.	Environmental management standards	6
4.	Green buildings	6
5.	Green Engineering	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Sustainability**
	Sustainability - Introduction, Need and concept of sustainability, Social environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislations in India - Water Act, Air Act.
2.	**Pollution**
	Air Pollution, Effects of Air Pollution; Water pollution- sources, Sustainable wastewater treatment, Solid waste - sources, impacts of solid waste, Zero waste concept, 3 R concept. Global environmental issues- Resource degradation, Climate change, Global warming, Ozone layer depletion, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon foot print.
3.	**Environmental management standards**
	Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking, Environment Impact Assessment (EIA) - Procedures of EIA in India.
4.	**Green buildings**
	Basic concepts of sustainable habitat, Green buildings, green materials for building construction, materialselection for sustainable design, green building certification, Methods for increasing energy efficiency of buildings. Sustainable cities, Sustainable transport. Energy sources: Basic concepts-Conventional and non- conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy

5.	Green Engineering
	Green Engineering, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis.

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publication/Edition
1.	Introduction to Sustainable Engineering	R. L. Rag	2nd Edition	S.K. Kataria& Sons
2.	Sustainable Engineering:Concept Design and case study	Allen	Latest	CBS Publishers
3.	Sustainable Engineering	Krishna R. Reddy	Latest	Standard Publishers Distributors
Websites				
https://nptel.ac.in/content/syllabus_pdf/105105106.pdf				
https://nptel.ac.in/courses/105105106/				
https://nptel.ac.in/courses/105106055/				
https://nptel.ac.in/content/syllabus_pdf/105106055.pdf				
https://nptel.ac.in/content/storage2/courses/105106055/Mod1/Lecture 1.pdf				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	1	-	-	-	-	-	-	-	-	-
CO.2	2	2	1	2	-	-	-	-	-	-	-	-
CO.3	2	3	-	1	-	-	-	-	-	-	-	-
CO.4	2	-	3	-	1	-	-	-	-	-	-	-
CO.5	2	2	2	1	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3	-	2	-	1
CO.2	2	3	-	1	-
CO.3	1	2	3	1	-
CO.4	-	2	2	-	3
CO.5	1	1	-	3	2

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

Code: BCVECV3113	BUILDING BY LAWS	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able

CO-1 Select the location and site for different types of buildings as per NBC and the different methods of drawing sun chart and sun shading devices.

CO-2 Analyze the Orientation of Building based on climatic and comfort Consideration as per Building Bye Laws and NBC Regulations.

CO-3 Analyze the building as per vastushastra by considering principle of planning.

CO-4 Design the residential and nonresidential building.

CO-5 Develop the lighting, ventilation, doors, windows, acoustics, sound insulation and noise control services in buildings.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Site Selection	6
2.	Orientation of Building & Building Bye – Laws	8
3.	Vastushastra & principles of planning	8
4.	Functional Design of Buildings	6
5.	Services in Buildings	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Site Selection**
	• Introduction, Types of buildings as per NBC, criteria for location and site selection, site plan and its detail. Sun shading devices, brief introduction to sun path and method to draw sun chart, design of louvers, energy conservation in buildings, passive solar cooling and heating of buildings.
2.	**Orientation of Building & Building Bye – Laws**
	• Introduction, Climatic and comfort Consideration: Elements of climate, global climate, climatic zones of India, climate modulating devices. Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate.
	• Building Bye Laws and NBC Regulations : Objective of by-laws, Regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation and sanitation provisions.
3.	**Vastu Shastra& Principles of Planning**
	• Introduction, Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc. VastuShastra in Modern Building planning: Factors considered in Vastu, site selection, orientation, planning and design of residential buildings.

4.	Functional Design of Buildings
	• Introduction, Functional design and Accommodation requirements
	• **Residential Buildings :** Anthropometry, activities and their spatial requirements; Area planning, living area, sleeping area, service area; Bubble diagram showing sequence of arrangement of area, plan, elevation, sectional elevation.
	Non Residential Buildings: viz-school buildings, rest house, primary health centers, post office, bank, college library, cinema theatres etc.

5.	Services in Buildings
	• Introduction, Services in Buildings, Lighting and ventilation, doors and windows. Acoustics, sound insulation and noise control.

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publisher
1.	Building Material & Construction	Gurcharan Singh	Latest	Charotar Publishing House Pvt. Ltd.
2.	Building Material & Construction	Bindra&Arora	Latest	DhanpatRai Publications
3.	Building construction	SC Rangawala	Latest	Standard Book House
Websites				
https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107006/lec21.pdf				
http://www.nptelvideos.in/2012/11/building-materials-and-construction.html				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	1	2	-	1	-	1	-	-	-	-	1
CO.2	1	1	2	-	1	-	-	-	-	-	-	-
CO.3	1	-	3	-	1	-	-	-	-	-	-	1
CO.4	2	-	3	-	1	-	-	-	-	-	-	-
CO.5	2	1	2	-	1	-	-	-	-	-	-	1

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	-	2	2	-
CO.2	2	-	1	3	1
CO.3	1	-	3	1	-
CO.4	2	-	3	-	-
CO.5	2	-	1	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

		POORNIMA UNIVERSITY, JAIPUR							
		Faculty of Engineering and Technology							
		Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 174							
		Teaching Scheme for Batch 2023-27							
		Semester-IV							
Course Code	**Name of Course**	**Teaching Scheme**			**SH**	**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorial (T)**	**Practical (P)**		**IE**	**ESE**	**Total**	
A.		**Major (Core Courses)**							
A.1	**Theory**								
BCVCCV4101	Structure Analysis-I	3	1	0		40	60	100	4
BCVCCV4102	Surveying	3	0	0	1*	40	60	100	3
BCVCCV4103	Concrete and Construction Technology	3	0	0	1*	40	60	100	3
BCVCCV4104	Energy Efficient Buildings	3	0	0	1*	40	60	100	3
A.2	**Practical**								
BCVCCV4201	Concrete Lab	0	0	2		60	40	100	1
BCVCCV4202	Surveying Lab	0	0	2	1*	60	40	100	1
BCVCCV4203	AutoCAD Lab	0	0	2	1*	60	40	100	1
		Minor Stream Courses / **Department Electives**							
B.1	**Theory**								
BCVECV4111	Sustainability in Building Design and Construction	3	0	0	1*	40	60	100	3
BCVECV4112	Sustainable Development								
BCVECV4113	Construction Equipment's								
B.2	**Practical**								
C		**Multidisciplinary Courses (MC)**							
BCVCBX4109	MOOC Course-III (Principles of Finance)	2	0	0		40	60	100	2
D		**Ability Enhancement Courses (AEC)**							
BULCHU4109	Negotiation Skills & Persuasive Communication	0	0	2		60	40	100	2
E		**Skill Enhancement Courses (SEC)**							
BULCSE4201	Skill Enhancement Generic Course-IV	0	0	2		60	40	100	1
BULCSE4202	Skill Enhancement Technical Course-I	0	0	2		60	40	100	2
F		**Value Added Courses (VAC)**							
	-	-	-	-					
G		**Summer Internship / Research Project / Dissertation**							
	Total	17	1	12	6*				
Total Teaching Hours		**30/36**							**26**

Code: BCVCCV4101	STRUCTURE ANALYSIS – I	4 Credits [LTP: 3-1-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1 Determine Slope and deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method.

CO2 Analyze the fixed and continuous beams using three moment theorem and area moment method.

CO3 Analyze torsion and membrane in shafts, shells and springs.

CO4 Investigate stress transformations in structural elements by using energy methods.

CO5 Evaluate the resistance of structure during vibrations.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Deflection of Beams	9
2.	Fixed & Continuous Beams	10
3.	Torsion & Membrane analysis	9
4.	Introduction to Energy Methods	12
5.	Vibrations	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Deflection of Beams**
	Introduction, Differential relation between load, shear force, bending moment, slope & deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method.
2.	**Fixed & Continuous Beams**
	Introduction, Analysis of fixed beams & continuous beams by three moment theorem and area moment method.
3.	**Torsion & Membrane analysis**
	Introduction, Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion **Springs:** stiffness of springs, close coiled helical springs, springs in series and parallel,laminated plate springs. **Membrane Analysis:** Stress and strain in thin cylindrical & spherical shells under internal pressures.
4.	**Introduction to Energy Methods**
	Introduction, Strain energy due to bending, shear and torsion; Castigliano's theorems, unit load method & their applications in analysis of redundant frames up to two degree of redundancy and deflection of determinate beams, frames and trussed beams, Stresses due to temperature & lack of fit in redundant frames. Theories of Failures.
5.	**Vibrations**
	Introduction, Stress tensor and failure criterion, Elementary concepts of structural vibration, degree of freedom, free vibration of un damped single degree of freedom systems.

Newton's law of motion, D'Almbert's principle, solution of differential equation of motion, frequency &period of vibration, amplitude of motion; Damped single degree of freedom system: types of damping, analysis of viscously damped, under-damped, over-damped & critically-damped systems, logarithmic decrement.

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publisher
1.	Structural Analysis	B.C.Punmia	Latest	Laxmi Publications
2.	Structural Analysis	CS Reddy	Latest	McGraw Hill Education
3.	Structural Analysis	SS Bhavakitti	Latest	Vikas Publishing House
4.	Structural Analysis	S Ramamurtham	Latest	DhanpatRai Publishing Company Private Limited-New Delhi
5.	Structural Analysis	RC Hibbeler	Latest	Pearson Education
Websites				

https://nptel.ac.in/content/syllabus_pdf/105105166.pdf

https://nptel.ac.in/courses/105105166/ https://nptel.ac.in/courses/105101085/

F. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	1	2	-	1	-	1	-	-	-	-	1
CO.2	1	1	2	-	1	-	-	-	-	-	-	-
CO.3	1	-	3	-	1	-	-	-	-	-	-	1
CO.4	2	-	3	-	1	-	-	-	-	-	-	-
CO.5	2	1	2	-	1	-	-	-	-	-	-	1

G. COs AND PSOs MAPPING

COs andPSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	-	2	2	-
CO.2	2	-	1	3	1
CO.3	1	-	3	1	-
CO.4	2	-	3	-	-
CO.5	2	-	1	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

Code: BCVCCV4102	SURVEYING	Credit 3 [LTP: 3-1-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1	Analyze the importance of surveying and the methods for measuring angles and elevation using theodolite.
CO2	Methods for measuring angles and elevation using auto level, Use of Plane table.
CO3	Select simple, compound, transition and reverse curves for proper alignment of roads.
CO4	Analyze the aerial photograph, aerial triangulation, radial triangulation and photographic mapping in photogrammetry surveying.
CO5	Implement setting out works & modern field survey systems.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction: Linear and Angular Measurements	10
2.	Levelling and Plane Table	8
3.	Curve Surveying	7
4.	Tacheometry and Photogrammetry Surveying	5
5.	Setting Out Works & Modern Field Survey Systems	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction: Linear and Angular Measurements**
	Method of linear measurements, Correction to length measured with a chain/tape, Ranging a survey line; direct and indirect Angular measurement by compass, Designation of bearing, Traversing with tapeand compass, Correction to measured bearing, Angular measurement by theodolite; Temporary adjustments, Method of horizontal angle measurement and vertical angle, Traverse computation, plotting of traverse and determining the closing error, Balancing traverse.
2.	**Levelling**
	Measurements of elevations methods of levelling; direct/differential, Indirect/Trigonometrical, and Profile/Cross sectional levelling. Digital and Auto level, Errors in levelling, contours and contour lines; methods of contouring; direct and indirect, characteristics, uses, area and vol. measurements. Plane Table Surveying: Elements of plane table survey working operations, methods of plane table survey; intersection, traversing and resection, two point and three point problems
3.	**Curve Surveying**
	Elements of simple and compound curves, Types of curves, Elements of circular, reverse, and transition curves. Method of setting out simple, circular, transition and reverse curves, Types of vertical curves, length of vertical curves, setting out vertical curves. Tangent corrections
4.	**Tacheometry and Photogrammetry Surveying**
	Advantages of tacheometric surveying, different systems of tacheometric measurements, Stadia system of tacheometry, distance elevation formulae for horizontal sights. Determination of tacheometric constants, distance and elevation formulae for inclined sights with staff vertical. Introduction to basic

5.	Setting Out Works & Modern Field Survey Systems
	Instruments and methods for laying out buildings, setting out culverts, setting out sewer lines.Principle of E.D.M. (Electronic Distance Measurements), Modulation, Types of E.D.M., Distomat, Total station, parts of total station, advantages and application

C. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Publisher
1.	Advanced Surveying: Total Station, GIS and Remote Sensing,	Madhu, N, Sathikumar, R and Satheesh Gobi	Latest	Pearson India, 2006
2.	Geomatics Engineering	Manoj, K. Arora and Badjatia	Latest	Nem Chand & Bros, 2011
2.	Surveying and Levelling, Vol. I and II	Bhavikatti, S.S.	Latest	I.K. International, 2010
3.	Higher Surveying, Third Edition	Chandra, A.M.	First	New Age International (P) Limited, 2002
4.	Remote sensing and Geographical information system	Anji Reddy, M	First	B.S. Publications, 2001
5.	Surveying, Vol-I, II and III	Arora, K.R.	Latest	Standard Book House, 2015

Websites:

http://www.nptelvideos.in/2012/11/surveying.html

https://nptel.ac.in/courses/105107122/ https://nptel.ac.in/courses/105108077/

https://nptel.ac.in/courses/105102015/

D.CO-PO Mapping

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	1	2	-	1	-	1	-	-	-	-	1
CO.2	1	1	2	-	1	-	-	-	-	-	-	-
CO.3	1	-	3	-	1	-	-	-	-	-	-	1
CO.4	2	-	3	-	1	-	-	-	-	-	-	-
CO.5	2	1	2	-	1	-	-	-	-	-	-	1

E. COs AND PSOs MAPPING

COs andPSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	-	2	2	-
CO.2	2	-	1	3	1
CO.3	1	-	3	1	-
CO.4	2	-	3	-	-
CO.5	2	-	1	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

Code: BCVCCV4103	CONCRETE AND CONSTRUCTION TECHNOLOGY	3 Credits [LTP: 3-1-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1   Relate the properties of concrete such as workability, air content, flow ability, strengths, permeability, creep and shrinkage.

CO2   Examine the mixing & batching methods, transportation, placing, compaction methods, curing methods and finishing and distinguish between admixture such as water reducers, accelerator, retarders, water-proofing plasticizers and super plasticizers.

CO3   Analyze light weight concrete, polymer concrete, fiber reinforced concrete, ready mixed concrete, self compacting and high performance concrete, ferro-cement concrete, Transparent concrete, cellular light weight concrete, pre-stressed concrete and roller compacted concrete.

CO4   Demonstrate form work and damp proofing processes.

CO5   Investigate the strength and durability of concrete by non-destructive testing and construction systems for joints, arches and lintels and stairs.

A.   OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Ingredients of concrete & Aggregate	8
2.	Properties of fresh & hardened concrete	6
3.	NDT & Concrete Handling in Field	6
4.	Admixture in concrete and Formwork	8
5.	Special Concrete	8

B.   DETAILED SYLLABUS

Unit	Unit Details
1.	**Ingredients of concrete & Aggregate**
	Ingredients of concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio etc. Aggregates: types, physical properties and standard methods for their determination, including Grading of aggregates as per IS. Manufactured sand- properties and IS Specifications for use in concrete.
2.	**Properties of fresh & hardened concrete**
	Concrete: Grade of concrete, proportioning of ingredients, water content and its quality, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. Factors affecting, methods of determination. Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate- cement interface, its effect on properties of concrete.
3.	**NDT & Concrete Handling in Field**
	NDT: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half-cell potential meter, corrosion resistivity meter, core sampling. Interpretation of their results, Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipment's for material handling, various methods their suitability and precautions. Compaction of concrete: methods & equipment's. Curing of concrete: various methods their suitability.

		Durability of concrete. Causes of deterioration, Carbonation, Tests for durability assessment.
4.	**Admixture in concrete and Formwork**	
	Admixture in concrete: Chemical and mineral admixtures, their types and uses: accelerator, retarders, water-proofing, plasticisers, super plasticizers-types, and their suitability. Fly ash-properties for use in concrete, specifications of flyash as per IS 3812, and effect on properties of concrete. GGBFS, Microsilica and metakaolin-propertie, specifications and utility in concrete. Form work: Requirements, their types. Typical formworks and shuttering/centering for Columns, beams, slabs, walls, etc. Slip and moving formwork.	
5.	**Special Concrete**	
	Special types of concrete: Sulphate resisting concrete, under water concreting, pumpable concrete: methods and issues in making, salient properties and applications. Concretes with tailored properties- including high performance concrete, with specific properties in fresh and hardened states, self-compacting concrete-materials, mix proportioning, test methods, use and applications with case studies	

C. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Publisher
1.	Concrete Technology	M. S. Shetty	Latest	S Chand Publishing
2.	Concrete Technology	M. L. Gambhir	Latest	McGraw Hill Education
3.	Building Construction and Materials	Rangwala	Latest	Charotar Publishing House Pvt. Ltd.
4.	Building Construction	Sushil Kumar	Latest	Standard Publisher Dist.
5.	Building Construction	B. C. Punamia	Latest	Laxmi Publications
6.	Building Construction	S.P. Bindra, S.P. Arora	Latest	DhanpatRai Publications

Websites:

https://nptel.ac.in/courses/105/102/105102012/
https://nptel.ac.in/courses/105106176/ https://nptel.ac.in/courses/105104030/

D. CO-PO MAPPINH

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	1	2	-	1	-	1	-	-	-	-	1
CO.2	1	1	2	-	1	-	-	-	-	-	-	-
CO.3	1	-	3	-	1	-	-	-	-	-	-	1
CO.4	2	-	3	-	1	-	-	-	-	-	-	-
CO.5	2	1	2	-	1	-	-	-	-	-	-	1

E. COs AND PSOs MAPPING

COs andPSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	-	2	2	-
CO.2	2	-	1	3	1
CO.3	1	-	3	1	-
CO.4	2	-	3	-	-
CO.5	2	-	1	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

Code: BCVCCV4104	**Energy Efficient Buildings Design**	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1 Design climate responsive building

CO2 Discover various physical properties influencing passive building design

CO3 Apply the passive(air)conditioning techniques in energy efficient building

CO4 Interpret the energy performance of buildings

CO5 Appraise the adaptation of renewable energy systems in buildings.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Introduction	8
2.	Landscape and Building Envelopes	6
3.	Passive Heating and Cooling	6
4.	Thermal Performance of Buildings	8
5.	Renewable Energy in Buildings	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction**
	Climate and Building, Historical perspective, Aspects of green building design – Sustainable Site, Water, Energy, Materials and IAQ, ECBC Standards
2.	**Landscape and Building Envelopes**
	Energy efficient Landscape design – Microclimate, Shading, Arbors, Windbreaks, Xeriscaping, Building envelope – Thermal comfort, Psychrometry, Comfort indices, Thermal Properties of Building Materials – Thermal Resistance, Thermal Time Constant (TTC), Diurnal Heat Capacity(DHC),ThermalLag, Decrement Factor, Effect of Solar Radiation –Sol-air Temperature, Processes of heat exchange of building with environment, Insulation.
3.	**Passive Heating and Cooling**
	HVAC introduction, Passive Heating – Solar radiation basics, Sun Path Diagram, Direct Heating, Indirect Heating and Isolated heating, Concept of Day lighting, Passive Cooling–Natural Ventilation(Stack and Wind),Evaporative Cooling and Radiative Cooling.

4.	**Renewable Energy in Buildings**
	Introduction of renewable sources in buildings, BIPV, Solar water heating, small wind turbines, stand-alone PV systems, Hybrid system–Economics.
5.	**Thermal Performance of Building**
	Heat transfer due to fenestration / infiltration, Calculation of Overall Thermal Transmittance, Estimation of building loads: Steady state method, network method, numerical method, correlations, Thermal Storage integration in buildings.

C. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Publisher
1.	Energy-efficient buildings in India	Mili Majumdar	Latest	TERI Press
2.	Climate considerations in building and Urban Design	Baruch Givoni	Latest	John Wiley &Sons,1998
3	Solar Engineering of Thermal Processes	JA Duffie and WA Beckman	Latest	John Wiley& Sons, 2006.
4.	Passive Low Energy Cooling of Buildings	Baruch Givoni	Latest	John Wiley & Sons
5.	Heating and cooling of buildings: Design for Efficiency	Jan F. Kreider, Peter S.Curtiss, Ari Rab	Latest	CRC Press,28-Dec-2009

Websites:

https://www.sciencedirect.com/book/9780128128176/handbook-of-energy-efficiency-in-buildings.

https://archive.nptel.ac.in/courses/105/102/105102175/

D. CO-PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	1	2	-	1	-	1	-	-	-	-	1
CO.2	1	1	2	-	1	-	-	-	-	-	-	-
CO.3	1	-	3	-	1	-	-	-	-	-	-	1
CO.4	2	-	3	-	1	-	-	-	-	-	-	-
CO.5	2	1	2	-	1	-	-	-	-	-	-	1

E. COs AND PSOs MAPPING

COs andPSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	-	2	2	-
CO.2	2	-	1	3	1
CO.3	1	-	3	1	-
CO.4	2	-	3	-	-
CO.5	2	-	1	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Deve

A. COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO.1	Analyze the cement and its basic properties.
CO.2	Evaluate Grade of concrete, proportioning of ingredients.
CO.3	Analyze the property of fine aggregate.
CO.4	Evaluate the impact of admixture in concrete.
CO.5	Analyze form work and design concrete mix.

B.   LIST OF EXPERIMENTS:

1.	To determine Normal Consistency, Initial & Final Setting Time of Cement
2.	To determine specific gravity of cement
3.	To determine fineness of cement
4.	To determine compressive strength of cement
5.	To determine soundness of cement
6.	To determine specific gravity of fine and coarse aggregates
7.	To determine bulking of fine aggregates
8.	To determine the fineness modulus of coarse aggregates and fine aggregates
9.	To determine workability of concrete mix by slump test
10.	To determine workability of concrete mix by compaction factor test
11.	To determine workability of concrete mix by Flow table test
12.	To design a concrete mix as per IS recommendation and check its compressive strength.
13.	To determine the split tensile strength of a given concrete sample.

VIRTUAL LABS

http://civ02.vlabs.ac.in/index.html#

C. COs AND POs MAPPING

COs and LOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	1	1	-	-	-	-	-	-	-	-	1
CO.2	2	1	3	-	-	-	-	-	-	-	-	1
CO.3	3	1	-	1	-	-	-	-	-	-	-	1
CO.4	1	1	3	-	-	-	-	-	-	-	-	1
CO.5	3	1	-	1	-	-	-	-	-	-	-	1

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3	2	-	-	1
CO.2	3	1	-	-	1
CO.3	3	1	-	-	-
CO.4	3	1	-	1	-
CO.5	2	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability

Code: BCVCCV4202	SURVEYING LAB	1 Credit [LTP : 0-0-2]

A. COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO.1	Analyze the basic principles and implementation of survey.
CO.2	Analyze procedures of triangulation.
CO.3	Analyze the measurements and adjust the angles of a braced quadrilateral using theodolite.
CO.4	Identify and correct errors and prepare map in field measurements using instruments.
CO.5	Evaluate angles, length of survey line and area measurement using Total Station.

B. LIST OF EXPERIMENTS:

1.	Ranging & fixing of Survey Stations using chain surveying.
2.	Determine Magnetic Bearing of a Line using Surveyor's Compass and Prismatic Compass.
3.	To measure and adjust the included angles of a closed traverse using prismatic compass.
4.	Determine the reduced levels using Tilting level.
5.	Measurement of horizontal angle by Theodolite using Repetition & Reiteration method.
6.	Determine Tachometric Constant and calculate horizontal and vertical distance by tachometric survey.
7.	Prepare a plan for a given area using Plane Table Surveying.
8.	Prepare a contour map for the given area
9.	To measure the horizontal and vertical angles by Theodolite.
10.	To determine the Height of an object by trigonometricallevelling.
11.	To measure and adjust the angles of a braced quadrilateral.
12.	To Prepare a topographic sheet incorporating features like contours, horizontal & vertical angles.
13.	To determine angles using EDM & Total station.

C. VIRTUAL LABS

http://sl-iitr.vlabs.ac.in/index.php?section=List%20of%20experiments

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	1	-	-	-	-	-	-	-	-	-	-
CO.2	1	2	2	-	-	-	-	-	-	-	-	-
CO.3	2	-	2	2	-	-	-	-	-	-	-	-
CO.4	1	-	1	2	-	-	-	-	-	-	-	-
CO.5	1	2	1	1	-	-	-	-	-	-	-	-

E. COs AND POs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	-	1	-	-
CO.2	2	2	-	3	-
CO.3	-	2	-	2	-
CO.4	2	-	-	2	-
CO.5	-	2	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability

Code: BCVCCV4203	AUTO CAD	1 Credit [LTP: 0-0-2]

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

CO	Description
CO.1	Demonstrate basic concepts of the AutoCAD software.
CO.2	Develop the ability to manipulate drawings through editing and plotting techniques.
CO.3	Analyze the geometric construction.
CO.4	Produce the template drawings.
CO.5	Apply basic concepts to develop construction (drawing) techniques.

LIST OF EXPERIMENTS:

1.	Introduction to Auto Cadd, Understanding of file format and X-Y Coordinate system. Introduction todifferent commands - Rectangle | Multi Line | Extend | Offset | Trim | Introduction to Object Snaps Rotate | Fillet | Chamfer | Array
2.	Introduction to Layer, Dtext, Table style, Zoom, Pan, Redraw&Regen Commands. Hatch, Pline, Pedit,Fillet, chamfer, spline, multiline command, Tolerance, Leader, Associative Dim, Dimedit, Dimstyle, X line, Ray command
3.	Using the commands learned draw brick & stone masonry, Partition wall, cavity wall & cross section of external wall
4.	Draw the details of doors and windows & Draw the details of cross sections of different type of stairs
5.	To design and draw working drawing of a Residential building with following detail (a) Site plan (b) Foundation plan (c) Plan (d) Two sectional elevations (e) Front elevation
6.	To continue the above design and draw working drawing of a Residential building with following additional detail (f) Furniture plan (g) Water supply and sanitary plan (h) Electric fitting plan
7.	To design and draw a Primary Health Center
8.	To design and draw a Primary School
9.	To design and draw a Rest House
10.	To design and draw a Post Office
11.	To design and draw a Bank
12.	To design and draw a College Library

VIRTUAL LABS:

- https://www.youtube.com/watch?v=-7hrElZrul4
- https://www.youtube.com/watch?v=cmR9cfWJRUU

COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	-	2	-	2	-	-	-	-	-	-	2
CO.2	2	-	2	-	2	-	-	-	-	-	-	2
CO.3	2	-	2	-	2	-	-	-	-	-	-	2
CO.4	1	-	2	-	2	-	-	-	-	-	-	2
CO.5	1	-	-	-	-	1	-	-	-	-	-	-

COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	2	-	1	-	-
CO.2	2	2	-	3	-
CO.3	1	3	-	2	1
CO.4	3	1	1	1	-
CO.5	3	2	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Entrepreneur

COURSE OVERVIEW AND OBJECTIVES:

To provide knowledge to students to accessible, aesthetics, cost effective, functional/operational, historic preservation, productive, secure/safe and sustainable and their inter relationships must be understood, evaluated and appropriately applied.

COURSE OUTCOMES:

After completion of the course, student will be able to:

CO	Description
CO.1	Compute the loads in buildings and distribution of load in building components with reference to IS-875 part 1 & 2.
CO.2	Solve the wind loads on the structure according to IS: 875-Part 3.
CO.3	Examine the earthquake loads on the structure according to IS: 1893 – Part 1.
CO.4	Design masonry buildings and framed buildings including earthquake loads.
CO.5	Demonstrate the mass housing and the special roofs such as folded plates, cylindrical shells, north-light shell roofs, grid and ribbed floors.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	**Design Loads**	**8**
2	**Lateral loads**	**6**
3	**Earthquake load**	**8**
4	**Masonry and Framed Buildings**	**6**
5	**Mass Housing**	**8**

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Design Loads**
	Introduction, Design loads for different types of buildings, (IS-875 part 1 & 2). Load distribution & concept of load flow to different structural components. **Structural Systems:** Assumption of integrity aspect ratios & over turning resistance, strength & stiffness of buildings, symmetry and Asymmetry in building forms, Vertical and lateral load resting elements, shear walls, framed tubes and various multistory configurations.
2	**Lateral loads**
	Introduction, Wind loads & calculation of wind load on structures (IS: 875-Part 3).
3	**Earthquake load**
	Introduction, Earthquake loads & calculations of earthquake loads on buildings masonry & framed structures, (IS: 1893 – Part 1).

4	**Masonry and Framed Buildings**
	Introduction **Masonry and Framed Buildings:** Design of masonry buildings and framed buildings, Earthquake resistant construction of buildings Various provisions as per IS codes; IS-4326, IS-13827, IS-13828, IS-13920, IS-13935.
5	**Mass Housing**
	Introduction **Mass Housing:** Prefabricated construction for mass housing **Special Roofs:** Introduction to folded plates, cylindrical shells, north-light shell roofs, grid and ribbed floors.

C. CO AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	1	2	-	2	-	-	-	-	-	-	2
CO.2	2	2	2	-	2	-	-	-	-	-	-	2
CO.3	2	1	2	-	2	-	-	-	-	-	-	2
CO.4	1	1	2	-	2	-	-	-	-	-	-	2
CO.5	1	1	-	-	-	1	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3	-	-	2	-
CO.2	3	-	-	2	-
CO.3	3	-	-	2	-
CO.4	3	-	-	2	1
CO.5	3	1	-	-	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / SkillDevelopment

Code: **BCVECV4112**	**SUSTAINABLE DEVELOPMENT**	**3 Credits [LTP: 3-1-0]**

COURSEOUTCOMES: After Successful completion of the course students will be able-

CO1   Understand the relevance and the concept of sustainability and the global initiatives in this direction.

CO2   Explain the different types of environmental pollution problems and their sustainable solutions.

CO3   Discuss the environmental regulations and standards.

CO4   Outline the concepts related to conventional and non-conventional energy

CO5   Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles.

A.   OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Sustainability	6
2.	Pollution	6
3.	Environmental management standards	6
4.	Green buildings	6
5.	Green Engineering	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Sustainability**
	Sustainability - Introduction, Need and concept of sustainability, Social environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislations in India - Water Act, Air Act.
2.	**Pollution**
	Air Pollution, Effects of Air Pollution; Water pollution- sources, Sustainable wastewater treatment, Solid waste - sources, impacts of solid waste, Zero waste concept, 3 R concept. Global environmental issues- Resource degradation, Climate change, Global warming, Ozone layer depletion, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon foot print.
3.	**Environmental management standards**
	Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking, Environment Impact Assessment (EIA) - Procedures of EIA in India.
4.	**Green buildings**
	Basic concepts of sustainable habitat, Green buildings, green materials for building construction, material selection for sustainable design, green building certification, Methods for increasing energy efficiency of buildings. Sustainable cities, Sustainable transport. Energy sources: Basic concepts-Conventional and non-conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy
5.	**Green Engineering**
	Green Engineering, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis.

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publication/Edition
1.	Introduction to Sustainable Engineering	R. L. Rag	2nd Edition	S.K. Kataria& Sons
2.	Sustainable Engineering: Concept Design and case study	Allen	Latest	CBS Publishers
3.	Sustainable Engineering	Krishna R. Reddy	Latest	Standard Publishers Distributors
Websites				
https://nptel.ac.in/content/syllabus_pdf/105105106.pdf				
https://nptel.ac.in/courses/105105106/				
https://nptel.ac.in/courses/105106055/				
https://nptel.ac.in/content/syllabus_pdf/105106055.pdf				
https://nptel.ac.in/content/storage2/courses/105106055/Mod1/Lecture1.pdf				

D. CO-PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	1	2	-	3	-	-	-	-	-	-	2
CO.2	2	2	2	-	3	-	-	-	-	-	-	2
CO.3	2	1	2	-	1	-	-	-	-	-	-	2
CO.4	1	1	2	-	1	-	-	-	-	-	-	2
CO.5	1	1	-	-	3	1	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3	-	-	2	-
CO.2	3	-	-	2	-
CO.3	3	-	-	2	-
CO.4	3	-	-	2	1
CO.5	3	1	-	-	1

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1	Introduction of different types of construction equipment
CO2	Uses, operations & efficiency, owning procedures, costs and maintenance of Earth Moving Equipment
CO3	Uses, operations & efficiency, owning procedures, costs and maintenance of Hauling Equipment & Compaction Equipment
CO4	Uses, operations & efficiency, owning procedures, costs and maintenance of Drilling, Blasting and Tunneling Equipment
CO5	Uses, operations & efficiency, owning procedures, costs and maintenance of Piling Equipment & Pumping Equipment

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	8
2	Earth Moving Equipment	6
3	Hauling Equipment & Compaction Equipment	8
4	Drilling, Blasting and Tunneling Equipment	6
5	Piling Equipment & Pumping Equipment	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction**
	Construction economy; Factors affecting the selection of construction equipment; rolling resistance, effect of grade on required tractive effort, effect of altitude and temperature on the performance of internal combustion engines, drawbar pull, rimpull and acceleration, owning and operating cost of equipment.
2	**Earth Moving Equipment**
	Crawler and wheel tractors-their functions, types and specifications; grade-ability, bull dozers and their use; tractor pulled scrapers, their sizes and output; effect of grade and rolling resistance on the output of tractor pulled scrapers; earth loaders; placing and compacting earth fills. Power shovels - functions, selection, sizes, shovel dimensions and clearances, output, Draglines – functions types ,sizes ,output, Clamshells; Safe lifting capacities and working ranges of cranes; Hoes ,trenching machines, types and production rates calculation of production rates of equipment; examples.
3	**Hauling Equipment & Compaction Equipment**
	Trucks; capacities of trucks, balancing the capacities of hauling units with the size of excavator; effect of grade and rolling resistance on the cost/performance of hauling equipment. Compaction Equipment: Roller class: sheep's foot rollers, pneumatic tyre rollers, steel wheel rollers, vibrating rollers, grid type rollers-their applications.
4	**Drilling, Blasting and Tunneling Equipment**
	Definition of terms ,bits, jackhammers, drifters, wagon drills, churn drills, piston drills, blast hole drills, shot drills, diamond drills; Tunneling equipment; selecting the drilling method and equipment; selecting drilling pattern; rates for drilling rock, air compressors.

5	Piling Equipment & Pumping Equipment
	Pile hammers, selecting a pile hammer loss of energy due to impact, energy losses due to causes other than impact.
	Equipment for bored and cast in-situ piles
	Pumping equipment in construction, Classification of pumps; Selection of pumps –Air-operated centrifugal type sump pumps; performance of centrifugal pumps; well point system.

C. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Construction equipment and its planning and applications	Verma, Mahesh	Latest	Metropolition Book Co. Ltd.
2	Heavy construction Planning, Equipment and Methods	Jagman Singh	Latest	Oxford and IBH
3	Construction Planning and Equipment	Satya Narayana B.	1990	Standard Publishers Distributors

D. CO-PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	2	3	1	3	-	-	-	-	-	-	2
CO.2	2	2	2	1	3	-	-	-	-	-	-	2
CO.3	2	1	2	-	1	-	-	-	-	-	-	2
CO.4	1	1	2	-	1	-	-	-	-	-	-	2
CO.5	1	1	-	-	3	1	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3	-	-	2	-
CO.2	3	-	-	2	-
CO.3	3	-	-	2	-
CO.4	3	-	-	2	1
CO.5	3	1	-	-	1

Faculty of Engineering and Technology

Name of Program: B.Tech. in Civil Engineering   Duration: 4 years   Total Credits: 174

Teaching Scheme for Batch 2023-27

Course Code	Name of Course	Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	Credits
		Teaching Scheme				**Marks Distribution**			
A.		**Major (Core Courses)**							
A.1	**Theory**								
BCVCCV5101	Structural Analysis-II	3	0	0	1*	40	60	100	3
BCVCCV5102	Design of Concrete Structures-I	3	0	0	1*	40	60	100	3
BCVCCV5103	Design of Steel Structures-I	3	0	0	1*	40	60	100	3
BCVCCV5104	Transportation Engineering	3	0	0	1*	40	60	100	3
A.2	**Practical**								
BCVCCV5201	Road Material Testing Lab	0	0	2		60	40	100	1
BCVCCV5202	Concrete Design Lab	0	0	2		60	40	100	1
BCVCCV5203	Steel Design Lab	0	0	2		60	40	100	1
BCVCCV5204	Industrial Technical Seminar-I	0	0	2		60	40	100	1
B.		Minor Stream Courses **/ Department Electives**							
B.1	**Theory (Any One)**								
BCVECV5111	Environmental Engineering								
BCVECV5112	Solid Waste Management	3	0	0		40	60	100	3
BCVECV5113	Waste Water Engineering				1*				
B.2	**Practical**								
C		**Multidisciplinary Courses**								
BCVCBX5109	MOOC Course-IV (Fundamentals of Marketing-II)	2	0	0					2
D		**Ability Enhancement Courses (AEC)**								
BULCHU5115	Entrepreneurial & Managerial Skills	0	0	2		60	40	100	1
E		**Skill Enhancement Courses (SEC)**								
BULCSE5201	Skill Enhancement Generic Course-V	0	0	2		60	40	100	1
BULCSE5202	Skill Enhancement Generic Course-VI	0	0	2		60	40	100	1
F		**Value Added Courses (VAC)**								
		-	-	-					
G		**Summer Internship / Research Project / Dissertation**								
	Total	17	0	14	5*				
	Total Teaching Hours	**30/36**							**24**

 SH: Supporting Hours
*Classes will be conducted fortnightly.

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1   Evaluate degree of freedoms for beams, frames with or without sway and moments in indeterminate structure by applying Maxwell's reciprocal theorem, Betti's theorem and slope-deflection method.

CO2   Analyze continuous beams and portal frames with and without inclined members using Moment distribution method.

CO3   Value forces in elements of suspension bridges, hinged arches and hinged stiffening girders.

CO4   Examine indeterminate structures using Column analogy method and Kani's method.

CO5   Create influence line diagram using concentrated loads and uniformly distributed loadsapplying Muller Breslau principle.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction to Indeterminate structures	6
2	Analysis of structures	8
3	Analysis of forces	8
4	Column Analogy method	8
5	Moving loads and influence lines	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction to Indeterminate structures**
	Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic Indeterminacy for beams, frames & portal with & without sway, Releases in structures, Maxwell's reciprocal theorem and Betti's theorem, Analysis of Statically Indeterminate Structures using Slope-deflection method.
2	**Analysis of structures**
	Analysis of structures using Moment distribution method applied to continuous beams and portal frames with and without inclined members.
3	**Analysis of forces**
	Introduction, Cables, suspension bridges and arches. Analysis of forces in cables-temperature effects-suspension bridges with three hinged and two hinged stiffening girders-theory of arches-Eddy's theorem-analysis of three hinged and two hinged arches -settlement and temperature effects.
4	**Column Analogy method**
	Introduction, Column Analogy method for indeterminate structures, determination of carry over factor forNon-prismatic section. Kani's Method: Analysis of beams and frames with & without sway by Kani's method.

5	Moving loads and influence lines
	Introduction to moving loads-concept of influence lines-influence lines for reaction, shear force and bending moment in simply supported beams and over hanging beams, Muller Breslau principle and its application to propped cantilevers
	Influence lines for forces in beams and trusses analysis for different types of moving loads, Single
	concentrated load-several concentrated loads uniformly distributed load shorter and longer than the span.

C. RECOMMENDED STUDY MATERIAL

Sr. No.	Book	Author	Publication
1	Mechanics of Structures Vol. I & II	S.B. Junarkar& Shah,	Charotar Publishing House.
2	Theory of Structures	B.C. Purnmia,	Laxmi Publication (P) Ltd.
3	Theory of Structures	Timoshenko,	McGraw Hill Book Co.
4	Structural Analysis	Ghali& Neville	E&FN Spon.
5	Structural Analysis	Hibbler R.C.,	PearsonS
Websites			

https://nptel.ac.in/courses/1051051/

https://nptel.ac.in/courses/1051010/

https://nptel.ac.in/courses/1051051/

https://nptel.ac.in/courses/105105109/

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code: BCVCCV5102	DESIGN OF CONCRETE STRUCTURE – I	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1: To develop basic understanding of reinforced concrete as a construction material.

CO2: To develop understanding of various design philosophies and their differences.

CO3: To understand behavior of RCC beams.

CO4: To understand behavior of RCC members under flexural shear.

CO5: To understand behavior of compression members.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	**Introduction**	6
2	Analysis of structures	8
3	**Limit state method**	8
4	**Slab**	8
5	**Columns**	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction**
	Objective and fundamental concepts of design of RC members, Types and function of reinforcement. Introduction to various related IS codes. Design Philosophies: Working stress, ultimate strength and limit states of design. Analysis and Design of singly reinforced rectangular beam section for flexure using Working Stress Method and Limit State Method.
2	**Analysis of structures**
	Analysis and design of singly reinforced, flanged beams and doubly reinforced rectangular beams for flexure using Limit State Method. Limit state of serviceability for deflection, control of deflection as per codal provisions of empirical coefficients.
3	**Limit state method**
	Limit state of collapse in shear: analysis and design of prismatic sections for shear using LSM. Limit state of collapse in bond: concept of bond stress, anchorage length and development length, curtailment of reinforcement as per codal provisions.
4	**Slab**
	Analysis and design of one way and two way slabs using LSM and Flat slab using direct design method as per code, Detailing of reinforcement.
5	**Columns**
	Columns: Short and long columns, their structural behaviour. Analysis and design of axially loaded short columns, using LSM. Analysis of uniaxially eccentrically loaded short columns. Introduction to Pu-Mu interaction curves and their use for eccentrically loaded columns. Design of Column Footings: Analysis and design of Isolated column footing and combined footing for two columns (without central beam) for axial loads using LSM

C. RECOMMENDED STUDY MATERIAL

Sr. No.	Book	Author	Publication
1	Reinforced Concrete: Limit State Design	Jain, A.K	NEM CHAND & BROTHERS-ROORKEE
2	Reinforced Concrete Design	Sinha,	McGraw Hill Education
3	Design of R.C.C. Structures,	Karve & Shah,	Assorted Editorial.
4	, Design of reinforced concrete & Pre-stressed concrete Structures	Kong & Evans	CRC Press
Websites			
https://nptel.ac.in/courses/1051051/			
https://nptel.ac.in/courses/1051010/			
https://nptel.ac.in/courses/1051051/			
https://nptel.ac.in/courses/105105109/			

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

| Code: **BCVCCV5103** | **DESIGN OF STEEL STRUCTURE – I** | **3 Credits [LTP: 3-0-0]** |

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1: Design of bolted and welded connections; concentric and eccentric

CO2: To develop understanding of various design philosophies and their differences.

CO3: Design of rolled and built-up compression members

CO4: Design of laterally supported and unsupported flexural members

CO5: Design of rolled and built-up tension members

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	**Introduction**	6
2	Connections	8
3	Compression Member	8
4	**BEAMS**	8
5	Member design under combined forces	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction**
	Introduction: Types of steels and their broad specifications. Plastic Analysis: Plastic analysis of steel structures, fundamentals, static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor. Classification of Cross Sections: As per IS 800-2007 Plastic, compact, semi compact, slender sections, their characteristics including momentrotation.
2	Connections
	Connections: Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings. Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded tension members.
3	Compression Member
	Compression Member: Types of buckling. Column buckling curves, Imperfection factor, Buckling curves for different cross sections. Design of compression member; Axially loaded compression members including angle section design: single and in pair, built up columns, design of lacings and battens
4	**BEAMS**
	Beams: Design of beams: simple and compound sections, main and subsidiary beams and their connections. Laterally supported and unsupported beam design, Web buckling, web crippling, lateral torsional buckling.
5	Member design under combined forces
	Member design under combined forces: Compressive load and uniaxial moment. tension and uniaxial moment Column Bases: Design of column bases, Slab base, gusseted base for axial and eccentric compressive load. Grillage foundation design.

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Edition	Publication
1	Design of Steel Structures	N. Subramanian	Latest	Oxford University Press.
2	Limit state Design of Steel Structures	S K Duggal	Latest	TMH publication
3	Design of Steel Structures	S. Bhavikatti	Latest	I.K. International Pvt. Ltd.
4	Design of Steel Structures	V.L. Shah	Latest	Structures Publications.
Websites				

https://nptel.ac.in/courses/105105162/

https://nptel.ac.in/courses/105105132/

https://nptel.ac.in/courses/105106113/

https://nptel.ac.in/content/syllabus_pdf/105105162.pdf

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code: BCVCCV5104	TRANSPORTATION ENGINEERING	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1   Demonstrate the planning, characteristics and development of transportation systems.

CO2   Analyze the Testing Procedures for highway construction-flexible and rigid pavements andmethods of constructing bituminous roads and concrete roads.

CO3   Evaluate highway geometric elements such as sight distances, super elevation, extra wideningand length of transition curves, gradients and camber.

CO4   Interpret the several road traffic engineering studies and types of traffic signs.

CO5   Design the plain and hilly pavement by G. I., CBR, Westergrad's and modified methods.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	6
2	Highway Materials and Construction	8
3	Highway Geometric Design	8
4	Elementary Traffic Engineering	6
5	Structural design of Highway Pavements	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction**
	Introduction: Importance and Role of Transportation Systems, Technological and Operating Characteristics of Transportation Systems, Components of transportation Systems, Transportation Coordination, Transportation Modes and their comparison. Highway Planning: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and Road Development Plans, Road Patterns, Controlling Factors and Surveys for Highway Alignment.
2	**Highway Materials and Construction**
	Highway Materials and Construction: Desirable Properties, Testing Procedures for highway construction-flexible and rigid pavements, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly-ash/pond-ash, Marshall Mix design method Methods of constructing different types of roads viz. Stabilized roads, WBM & WMM , Bituminous roads and Concrete roads. Specific features of rural roads.
3	**Highway Geometric Design**
	Highway Geometric Design: Cross Sectional Elements, camber, Sight Distances-definition and analysisof SSD and OSD, Design of Horizontal Alignment – Super elevation, extra widening, and transition curves. Design of Vertical Alignment – Gradients, Vertical curves.

4	Elementary Traffic Engineering
	Introduction, Elementary Traffic Engineering: Significance of different Traffic Engineering Studies viz. Speed, Volume, O & D, Parking and Accident's Study, analysis and application of different traffic surveydata, Importance and types of Traffic Signs, Signals and 2 phase signal design , Road Markings and Road Intersections.
5	Structural design of Highway Pavements

	Structural design of Highway Pavements: Design of Flexible Pavements by G. I. and CBR methods. Design of Rigid Pavements by Westergrad's and modified methods. (As per guidelines of IRC) Hill Roads: Special factors in Alignment and Geometric design, Drainage and maintenance of Hill roads. Road side Arboriculture and Landscaping. Recent Developments in Urban Roads and their role in economic developments.

C. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Highway Engineering	Khanna, S.K. and Justo, C.E.G.	Latest	Nem Chand & Bros. 2004
2	Highway Material Testing Manual	Khanna, S.K. and Justo, C.E.G.	Latest	Nem Chand & Bros. 2004
3	Traffic Engineering and Transportation Planning	Kadiyali, L.R.	Latest	Khanna Publishers. 2002
4	Principles and Design of Highway Engineering	Sharma, S.K.	Latest	S. Chand & Co. 1995
Websites				
https://nptel.ac.in/courses/1051010/				
https://nptel.ac.in/courses/1051051/				
https://nptel.ac.in/courses/1051071/				
https://nptel.ac.in/courses/1051040/				
https://nptel.ac.in/courses/1051010/				
https://www.journals.elsevier.com/transportation-engineering/				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1	Identify the fineness modulus of coarse aggregate.
CO2	Acquire the adequate knowledge on angularity, impact and abrasion value of aggregate.
CO3	Identify the viscosity, crushing, specific gravity and water absorption of the aggregate.
CO4	Justify the construction practices of aggregate by knowing the ductility, flakiness and elongationindex of the aggregate.
CO5	Test the marshall stability test.

A. LIST OF EXPERIMENTS

1. To determine fineness modulus of a given sample of coarse aggregate.
2. Angularity number test
3. Aggregate impact test
4. Los angles abrasion test
5. Aggregate crushing value test
6. Standard tar viscometer test
7. Specific gravity and water absorption test
8. To determine the elongation index for given sample of aggregate.
9. To determine the flakiness index of given sample of aggregate.
10. Ductility test
11. To determine the softening point for give a sample of bitumen.
12. Marshall stability test
13. Flash and Fire Point

B. VIRTUAL LAB
- https://www.youtube.com/watch?v=Mn7aeorMpTs
- https://www.youtube.com/watch?v=acfJIG9o8iw
- https://www.youtube.com/watch?v=k6wXH50Kwkw
- https://www.youtube.com/watch?v=lE7LFOuGKyI
- https://www.youtube.com/watch?v=BPdzkfkFnvw
- https://www.youtube.com/watch?v=hqXFPq676iM
- https://www.youtube.com/watch?v=_0OUwEDorYg

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

| Code: BCVCCV5202 | CONCRETE DESIGN LAB | 1 Credits [LTP: 0-0-2] |

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1	Design philosophies of reinforced concrete structures.
CO2	Apply the principles, procedures and current code requirements to the analysis and design of reinforcedconcrete beams.
CO3	Identify the behavior of reinforced concrete members in bond, anchorage, shear and torsion
CO4	Analyze and design reinforced concrete compression members.
CO5	Analyze the load on the structure and design the footings.

LIST OF EXPERIMENTS
Design as per syllabus of theory.

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1	Appropriate methods of structural design for the design of steel structures by applying the fundamentals of mechanics.
CO2	Acquire adequate knowledge in the design of steel structural elements.
CO3	Identify the behavior of compression member.
CO4	Analyze and design the steel joist beam.
CO5	Apply the principle, procedure and current code in the design of column base.

A. LIST OF EXPERIMENTS
Design as per syllabus of theory.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

C.COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1   Illustrate the effectiveness of research paper reading and writing.

CO2   Examine well recognized research papers from reputed journals, conferences.

CO3   Analyzethemethodofsearchingofresearchpaperconcludingtheworkdoneinpaper.

CO4   Analyze the abstract and methodologies of the research paper.

CO5   Illustrate the techniques to create a review paper.

GUIDELINES:

- At the end of the Fifth semester each student would undergo Industrial Training in an industry /Professional organization Research Laboratory with the prior approval of the Head of Department and Training & Placement Officer,

- Students shall be required to submit a written type report along with a certificate from the organization and present a PPT based on the training.

- Students shall be required to give the presentations in the allotted period about the training attended after 5th Semester

The presentation and report of the Trainings hall be evaluated during this period (=2 hrs per week) byBoard of Examiners to be appointed by the Faculty Coordinator-Training Seminar who will award thegrades

A. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code: BCVECV5111	ENVIRONMENTAL ENGINEERING	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1	Demonstrate the environment and its component and design water demand based on flow, periods and population.
CO2	Compare sources of water and collection works and also investigate the physical and chemical properties of water.
CO3	Analyze the hydraulic Conduits, pipe material, pipe joints, pump station and types of water treatment process.
CO4	Interpret advanced treatment of water such as filtration, disinfection and dissolved solids removaland design water treatment plant.
CO5	Design the water distribution system and analyze plumbing system for water supply.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	General	8
2	Source of water and collection works	8
3	Transmission of water	6
4	Advanced Treatment of Water	6
5	Distribution of water	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	**General**
	Introduction, Environment and its components, Importance of water, Role of an Environmental Engineer,Historical overview. **Water Demand:** Design flow, design periods, and design population, factors affecting water consumption, variation in water demand, design capacities for various water supply components.
2	**Source of water and collection works**
	Introduction, Alternative sources i.e. rain, surface and ground water, Assessment of yield anddevelopment of the source. **Quality of water:** The hydrological cycle and water quality, physical, chemical and biological water quality parameters, water quality requirements, Indian Standards.
3	**Transmission of water**
	Introduction, Hydraulics of conduits, selection of pipe materials, pipe joints, pumps, pumps station. Preliminary Treatment of Water: Historical overview of water treatment, water treatment processes(theory and application): aeration, solids separation, settling operations, coagulation, softening.
4	**Advanced Treatment of Water**
	Introduction, filtration, disinfection, other treatment processes, dissolved solids removal, treatment plant design, preparation of hydraulic profiles.
5	**Distribution of water**
	Method of distributing water, distribution reservoirs, distribution system, distribution system components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems, pumping required for water supply system. **Plumbing of Building for water supply:** Service connections, fixture units, simultaneous flow, design of plumbing system.

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Edition	Publication
1	Water Supply	S.K. Garg,	Latest	Khanna Publishing Co.
2	Environmental Engineering	Peavy, H.S., Rowe D.R. and Techobanoglous	Latest	McGraw Hill, Book Company
3	Manual of Water Supply and Water Treatment			Ministry of Urban Development, Govt. of India.
	Website			
	https://nptel.ac.in/courses/1051061/			
	https://nptel.ac.in/courses/1051071/			
	https://nptel.ac.in/courses/1271050/			
	https://nptel.ac.in/courses/1051030/			
	https://nptel.ac.in/courses/105102160/			

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1	Examine composition and properties of municipal solid waste.
CO2	Interpret solid waste generation, solid waste quantities and process of collection.
CO3	Demonstrate processing of waste separation and handling of solid waste at residence e.g. Storage,conveying, compacting, Shredding, pulping, granulating etc.
CO4	Distinguish among disposal processes of municipal solid wastes like combustion, landfill, and biochemical processes.
CO5	Analyze the characteristics of hazardous solid waste such as toxicity, reactivity, infectiousness, flammability, radioactivity, corrosiveness, irritation, bio-concentration, genetic activity andexplosiveness.

A.OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Composition and Properties of Municipal Solid Waste	8
2	Solid Waste Generation and Collection	6
3	Separation and Processing of Solid Waste	8
4	Disposal of Municipal Solid Waste	6
5	Hazardous Solid Waste	8

B.DETAILED SYLLABUS

Unit	Unit Details
1.	**Composition and Properties of Municipal Solid Waste**
	Introduction, Sources of solid waste, Types of solid waste. Composition of solid waste and its determination. Types of materials recovered from Municipal solid waste (MSW). Physical, Chemicaland Biological and properties of Municipal Solid Waste, Transformation of Municipal Solid Waste.
2.	**Solid Waste Generation and Collection**
	Introduction, Measurements, and methods to measure solid waste quantities. Solid waste generationand collection. Factors affecting solid waste generation rate. Quantities of materials recovered from MSW.
3.	**Separation and Processing of Solid Waste**
	Introduction, Handling and separation of solid waste At site. Material separation by pick in, screens, float and separator magnets and electromechanical separatorand other latest devices for material separation. Processing of solid waste at residence e.g. Storage, conveying, compacting, Shredding, pulping, granulating etc. Processing of solid waste at Commercial and industrial site.
4.	**Disposal of Municipal Solid Waste**

	Introduction, Combustion and energy recovery of municipal solid waste, Effects of combustion, undesirable effects of Combustion. **Landfill:** Classification, planning, sitting, permitting, landfill processes, landfill design, landfilloperation, use Of old landfill. Differentiate sanitary land fill and incineration as final disposal system for solid waste **Biochemical processes:** Methane generation by anaerobic digestion, composting and other biochemical Processes.
5.	**Hazardous Solid Waste**
	Introduction, Definition, identification and classification of hazardous solid waste. Characteristics Hazardous waste toxicity, reactivity, infectiousness, flammability, radioactivity, corrosiveness, irritation, bio-concentration, genetic activity, explosiveness. Bio-medical waste, its sources, generation, storage, transportation and Disposal.

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Integrated Solid WasteManagement	George Tchobanoglous and Hillary theisen, Samuel Vigil	Latest	McGraw Hill
2.	Disposal and recovery ofmunicipal solid waste	Michael E Henstock	Latest	Butterworth-Heinemann Ltd (January 1983)
3.	Solid Waste Management	P AarneVesilig	Latest	Cengage Learning CustomPublishing
4.	Environmental Engineering	Mackenzie L Davis, David A Cornwell	Latest	McGraw-Hill Inc.
Websites				
https://nptel.ac.in/courses/120108005/ https://nptel.ac.in/courses/105/106/105106056/ https://nptel.ac.in/courses/105105160/				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2

CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code: BCVECV5113	WASTE WATER ENGINEERING	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO1 Evaluate the waste water parameters and sewage quality parameters with quality assessment methods.

CO2 Analyze the types of sewerage system and design of sewerage system.

CO3 Apply the treatment processes for sewage with consideration of sustainable or economical uses.

CO4 Demonstrate wastewater disposal and reuse, self-purification of streams and design plumbing system for buildings.

CO5 Interpret air and noise pollution through Air quality, Emission standards and vehicular pollution.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	General	8
2	Collection of Sewage	8
3	Sewage Treatment	6
4	Wastewater Disposal and Reuse	6
5	Air and Noise Pollution	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	**General**
	General Terms: sewerage, domestic sewage, sewage treatment, disposal scope, Role of an Environmentalengineer, historical overview.
	Sewage Characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, and Standards of disposal into natural watercourses and on land, Indian standards.
2	**Collection of Sewage**
	Collection of Sewage: Systems of sewerage, Separate, combined, and partially separate, components of sewerage systems, systems of layout, quantity of sanitary sewage and variations, quantity of storms water, rational method, shapes of sewer **Hydraulic design of sewers:** diameter self-cleansing velocity and slopes, construction and testing ofsewer line, Sewer materials, joints and appurtenances, Sewage pumping and pumping stations, maintenance of sewerage system.
3	**Sewage Treatment**

	Sewage Treatment: Various units: their purpose, sequence and efficiencies, preliminary treatment, screening and grit removal units, oil and grease removal, primary treatment, secondary treatment, activated sludge process, trickling filter, sludge digestion and drying beds, stabilization pond, septic tank, soakage systems, recent trends in sewage treatment, advanced wastewater treatment :nutrient removal, solids removal.

4	**Wastewater Disposal and Reuse**
	Introduction of Wastewater Disposal and Reuse: Disposal of sewage by dilution, self-purification of streams, sewage disposal by irrigation sewage farming, waste waters reuse. Plumbing for Design of Buildings: Various systems of plumbing – one pipe, two pipes, single stack, traps, layout of house drainage.
5	**Air and Noise Pollution**
	Air and Noise Pollution: Air quality, Emission standards, vehicular pollution, Effect of air pollution on human health, Noise Pollution, global effect of air and noise pollution, greenhouse effect, acid rain etc.

C. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Environmental Engineering II	B.C. Punmia	Latest	Arihant Publishers, Jodhpur.
2	Sanitary Engineering	SK Garg,	Latest	Khanna Publishing Co.
3	Manual on Sewage and Sewage		Latest	Treatment Ministry of Urban Development Govt. of India.
Websites				

- https://nptel.ac.in/courses/103107084/

- https://nptel.ac.in/courses/103107085/

- https://nptel.ac.in/courses/105104102/

- https://nptel.ac.in/courses/105103025/

- https://nptel.ac.in/courses/105102160/

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

		POORNIMA UNIVERSITY, JAIPUR							
		Faculty of Engineering and Technology							
		Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 174							
		Teaching Scheme for Batch 2023-27							
		Semester-VI							
Course Code	**Name of Course**	**Teaching Scheme**			**SH**	**Marks Distribution**			**Cred its**
		Lecture (L)	**Tutorial (T)**	**Practical (P)**		**IE**	**ESE**	**Total**	
A.		**Major (Core Courses)**							
A.1	Theory								
BCVCCV6101	MOOC Course (As Described in Annexure-II)	3	0	0		40	60	100	3
A.2	Practical								
BCVCCV6201	Industrial Technical Seminar-II	0	0	4		60	40	100	2
B.		**Minor Stream Courses / Department Electives**							
B.1	Theory								
	-								
B.2	Practical								
	-								
C		**Multidisciplinary Courses**							
	-	-	-	-					
D		**Ability Enhancement Courses (AEC)**							
	-	-	-	-					
E		**Skill Enhancement Courses (SEC)**							
	-	-	-	-					
F		**Value Added Courses (VAC)**							
	-	-	-	-					
G		**Summer Internship / Research Project / Dissertation**							
BCVCCV6401	Internship	0	0	12		40	60	100	6
Total		3	0	16					
Total Teaching Hours		**19**							**11**

SH: Supporting Hours
*Classes will be conducted fortnightly.

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO.1 Illustrate the effectiveness of research paper reading and writing.

CO.2 Examine well recognized research papers from reputed journals, conferences.

CO.3 Analyzethemethodofsearchingofresearchpaperconcludingtheworkdoneinpaper.

CO.4 Analyze the abstract and methodologies of the research paper.

CO.5 Illustrate the techniques to create a review paper.

A. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

		POORNIMA UNIVERSITY, JAIPUR							
		Faculty of Engineering and Technology							
		Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 174							
		Teaching Scheme for Batch 2023-27							
		Semester-VII							
Course Code	**Name of Course**	**Teaching Scheme**				**Marks Distribution**			**Cred its**
		Lecture (L)	**Tutorial (T)**	**Practical (P)**	**SH**	**IE**	**ESE**	**Total**	
A.		**Major (Core Courses)**							
A.1	**Theory**								
BCVCCV7101	Geotechnical Engineering-I	3	0	0		40	60	100	3
BCVCCV7102	Design of Concrete Structures-II	3	1	0	1*	40	60	100	4
BCVCCV7103	Design of Steel Structures-II	3	0	0	1*	40	60	100	3
BCVCCV7104	Estimation and Costing	3	0	0		40	60	100	3
A.2	**Practical**								
BCVCCV7201	Geotechnical Engineering Lab-I	0	0	2		60	40	100	1
BCVCCV7202	Concrete Design Lab	0	0	2	1*	60	40	100	1
BCVCCV7203	Quantity Surveying and Valuation Lab	0	0	2		60	40	100	1
BCVCCV7204	AI in Building Automation	0	0	2		60	40	100	1
BCVCCV7205	Steel Design Lab	0	0	2		60	40	100	1
B.		Minor Stream Courses**/ Department Electives**							
B.1	**Theory (Any One)**								
BCVECV7111	Ground Improvement Techniques								
BCVECV7112	Ground Water Contamination								
BCVEBX7113	Principles of Finance								
B.2	**Practical**								
	-								
C		**Multidisciplinary Courses**							
D		**Ability Enhancement Courses (AEC)**							
		-	-	-					
E		**Skill Enhancement Courses (SEC)**							
	-	-	-	-					
F		**Value Added Courses (VAC)**							
	-	-	-	-					
G		**Summer Internship / Research Project / Dissertation**							
BCVCCV7301	Minor Project	0	0	4	3*	60	40	100	2
Total		14	2	14	6*				23
Total Teaching Hours		30 / 36							

SH: Supporting Hours
*Classes will be conducted fortnightly.

Code: BCVCCV7101	GEOTECHNICAL ENGINEERING- I	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1	Evaluate the properties of soil i.e. water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights and density index.
CO2	Demonstrate clay mineralogy, clay structure and Darcy's law of permeability of soil.
CO3	Examine stresses in soil mass, quicksand phenomenon, seepage and seepage pressure, laplace'sequation for seepage, phreatic line and flow net through earth dam.
CO4	Investigate the shear strength of soil by direct shear box triaxial and unconfined compression test apparatuses.
CO5	Analyze the Principles of soil compaction and soil stabilization.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction to Soil	6
2	Clay mineralogy	6
3	Stresses in soil	8
4	Shear in soil	8
5	Compaction of soil	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction to soil**
	Introduction: Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, Degreeof saturation, air void and air content, unit weights, density index etc., Inter-relationships of the above . Determination of index properties of soil: water content, specific gravity, particle size distribution, sieveand sedimentation analysis, Consistency limits, void ratio and density index, Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems.
2	**Clay mineralogy**
	Clay mineralogy: Soil structure; single grained, honeycombed, flocculent, and dispersed, structure of composite soils, Clay structure; basic structure, mineral structures, structures of Illite Montmorilinite and kaolinite and their characteristics, Soil water absorbed, capillary and free water Darcy's law of permeability of soil and its determination in laboratory, Field pumping out tests, factors affecting permeability, permeability of stratified soil masses.
3	**Stresses in soil**
	Stresses in soil mass: total, effective and neutral pressure, Calculation of stresses, influence of water table on effective stress, Quicksand phenomenon, Seepage and Seepage Pressure , Laplace's equation forseepage. Flow net and its construction, Uplift pressure, piping, principle of drainage by electro Osmosis, Phreatic line, Flow net through earth dam.

4	Shear in soil
	Introduction, Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box, Triaxial and unconfinedcompression test apparatuses, Typical stress-stain curves for soils, Typical failure envelopes for cohesion less soils and normally consolidated clay soils.
5	Compaction of soil
	Introduction, Principles of soil compaction, laboratory compaction tests; Proctor's test Modified Proctor tests, Measurement of field compaction, field methods of compaction and its control, dry and wet of optimum, factors affecting compaction, compaction equipment, Soil stabilization, Mechanical Stabilization. Stabilization with cement, lime and bitumen.

C. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Basic and applied Civil Mechanics	Rajan&Rao,	Latest	New Age International Publishers.
2	Soil Mechanics & Foundation Engineering	Arora K.R,	Latest	Standard Publishers and Distributers, Delhi.
3	Soil Engineering in Theory & Practice	Alam Singh,	Latest	CBS Publishers and Distributers, Delhi.
4	Geotechnical Engineering—Principles and Practices		Latest	Coduto PHI Publishers.
Website				

- https://nptel.ac.in/courses/105101201/
- https://nptel.ac.in/courses/105105168/
- https://nptel.ac.in/courses/105106142/
- https://nptel.ac.in/courses/105101001/
- https://nptel.ac.in/courses/105105185/

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code: BCVCCV7102	DESIGN OF CONCRETE STRUCTURE – II	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1: To develop basic understanding of reinforced concrete as a construction material.

CO2: To develop understanding of various design philosophies and their differences.

CO3: To understand behavior of RCC beams.

CO4: To understand behavior of RCC members under flexural shear.

CO5: To understand behavior of compression members.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Elements of Pre-stressed Concrete	6
2	Torsion and Continuous and Curved Beams:	8
3	Circular Domes and Water Tanks and Towers	8
4	Yield Line Theory and Retaining walls	8
5	Culverts and Bridges	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	Elements of Pre-stressed Concrete
	Principles and systems, material properties, losses of pre-stress, I.S. specifications, analysis and design of rectangular and T sections for flexure and shear
2	Torsion and Continuous and Curved Beams:
	Torsion: Analysis and Design of beams for torsion as per codal method. Continuous and Curved Beams: Analysis and Design of continuous beams using coefficients (IS Code), concept of moment redistribution. Analysis and design of beams curved in plan.
3	Circular Domes and Water Tanks and Towers
	Circular Domes: Analysis and design of Circular domes with u.d.l. & concentrated load at crown. Water Tanks and Towers: Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging.
4	Yield Line Theory and Retaining walls
	Yield Line Theory: Introduction to Yield line concept, Application of Y.L.T. to slabs with simple support conditions. Retaining walls: Analysis and design of Cantilever Retaining Walls: Introduction to counterfort and buttress type retaining walls, their structural behaviour and stability analysis
5	Culverts and Bridges
	Culverts and Bridges: Analysis and Design of super structure of slab culverts and T-bridge for I.R.C. loading

C. RECOMMENDED STUDY MATERIAL

Sr. No.	Book	Author	Publication
1	Reinforced Concrete: Limit State Design	Jain, A.K	NEM CHAND & BROTHERS-ROORKEE
2	Reinforced Concrete Design	Sinha,	McGraw Hill Education
3	Design of R.C.C. Structures,	Karve & Shah,	Assorted Editorial.
4	, Design of reinforced concrete & Pre-stressed concrete Structures	Kong & Evans	CRC Press
Websites			

https://nptel.ac.in/courses/1051051/

https://nptel.ac.in/courses/1051010/

https://nptel.ac.in/courses/1051051/

https://nptel.ac.in/courses/105105109/

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1	Demonstrate plastic analysis of steel structure and classification of cross sections as per is 800-2007.
CO2	Design the bolted and welded connections under axial and eccentric loadings and axial loaded tension members.
CO3	Design of steel compression member as per IS: 800 – 2007.
CO4	Design the laterally supported and unsupported beam beams and their connections.
CO5	Design the column bases, slab base, gusseted base for axial and eccentric compressive load and grillage foundation and demonstrate plate girder, gantry girder, foot over bridges.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Gantry Girder	6
2	Plate Girder	8
3	Bridges	8
4	Truss Member	8
5	Design of tanks	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	Gantry Girder
	Design of gantry girder. Design of roof trusses including wind loading and purlin design, Introduction to Pre Engineered Buildings and tubular sections and their applications.
2	Plate Girder
	Design of plate girder: Design of welded and bolted sections. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections. Web and flange splicing. Horizontal, Intermediate and Bearing stiffeners. Curtailment of plates. Shear strength determination by post critical and tension field action methods. End panel design options and procedure as per IS 800.
3	Bridges
	Bridges: Types of bridges, Loadings, Standard loading for railway bridges, Design of Deck type plate-girder bridges, design of its bracings and frames.
4	Truss Member
	Design aspects of foot over bridges. Design of through type truss girder bridges including stringer design, cross girder design, main truss members, portal and sway bracings etc.

5	Design of tanks
	Water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging.

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Edition	Publication
1	Design of Steel Structures	N. Subramanian	Latest	Oxford University Press.
2	Limit state Design of Steel Structures	S K Duggal	Latest	TMH publication
3	Design of Steel Structures	S. Bhavikatti	Latest	I.K. International Pvt. Ltd.
4	Design of Steel Structures	V.L. Shah	Latest	Structures Publications.
Websites				

https://nptel.ac.in/courses/105105162/

https://nptel.ac.in/courses/105105132/

https://nptel.ac.in/courses/105106113/

https://nptel.ac.in/content/syllabus_pdf/105105162.pdf

https://www.hindawi.com/journals/jstruc/?utm_source=google&utm_medium=cpc&utm_campaign=HD

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D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1	Differentiate grain sizes by sieve analysis for soil.
CO2	Evaluate water content and specific gravity for soil by pycnometer.
CO3	Examine consistency tests, standard proctor test and modified proctor test.
CO4	Analyze engineering properties of soil like shear strength, swelling pressure, free swell.
CO5	Evaluate bearing strength by soil by different laboratory tests.

A. LIST OF EXPERIMENTS

1. Grain size distribution by sieving.

2. Determination of water content by Pycnometer.

3. Determination of specific Gravity by Pycnometer.

4. Determination of liquid limit by Casagrande's apparatus.

5. Determination of liquid limit by cone penetrometer.

6. Determination of plastic limit

7. Determination of shrinkage limit

8. Determination of field density by core-cutter

9. Determination of field density by sand replacement method

10. Determination of compaction properties by standard Proctor Test Apparatus

11. Determination of C-Ø values by Direct Shear Test Apparatus

12. Determination of Unconfined Compressive Strength by unconfined compression Test Apparatus

B. VIRTUAL LABS

http://smfe-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO.1   Design philosophies of reinforced concrete structures.

CO.2   Apply the principles, procedures and current code requirements to the analysis and design of reinforcedconcrete beams.

CO.3   Identify the behavior of reinforced concrete members in bond, anchorage, shear and torsion

CO.4   Analyze and design reinforced concrete compression members.

CO.5   Analyze the load on the structure and design the footings.

A. LIST OF EXPERIMENTS

Design as per syllabus of theory.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

| Code: BCVCCV7203 | QUANTITY SURVEYING AND VALUATION LAB | 1 Credits [LTP: 0-0-2] |

LAB OUTCOMES: After Successful completion of the lab students will be able to-

- **CO.1** Select and finalize the method of quantity survey of building.
- **CO.2** Rate analysis of different building items.
- **CO.3** Introduction of different plans of Building.
- **CO.4** Introduction of Bar bending schedule.
- **CO.5** Introduction of Specifications and Valuation.

A. LIST OF EXPERIMENTS

1	Preliminary Estimate (Plinth Area and Cubic Content)
2	Detailed Estimate of buildings (Long wall-Short wall and Centre line method)
3	Rate Analysis of different Items of Works (Earthwork, Concrete Work, DPC, Stone masonry, Brickwork, RCC, Roofing, Flooring, and Finishing etc.)
4	Earthwork Calculation for Roads, Irrigation Canals and Channels (cutting and filling)
5	Valuation of Buildings and Properties Visual interpretation of satellite images
6	Site plan, index plan, layout plan, plinth area, floor area of buildings.
7	Foundation plan layout infield
8	Bar bending schedule
9	Specifications- For different classes of building and Civil Engineering works
10	Specifications of building components
11	Valuation of buildings and properties
12	Work at heights – scaffolding and ladders use, type of scaffolds, safety requirements, design and load factors, defects and inspection norms, type of ladders, upkeep, defects and good maintenance tips.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO.1 Appropriate methods of building automation for the design of structures by applying the fundamentals of mechanics.

CO.2 Acquire adequate knowledge in the design of frame elements.

CO.3 Identify the behavior of compression member.

CO.4 Analyze and design the steel joist beam.

CO.5 Apply the principle, procedure and current code in the process of automation.

A. LIST OF EXPERIMENTS
Design as per syllabus of theory.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

| Code: BCVCCV7205 | STEEL DESIGN LAB | 1 Credits [LTP: 0-0-2] |

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO.1	Appropriate methods of structural design for the design of steel structures by applying the fundamentals of mechanics.
CO.2	Acquire adequate knowledge in the design of steel structural elements.
CO.3	Identify the behavior of compression member.
CO.4	Analyze and design the steel joist beam.
CO.5	Apply the principle, procedure and current code in the design of column base**.**

D. LIST OF EXPERIMENTS

Design as per syllabus of theory.

E. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

F. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1   Understand the preparation of an Abstract Estimate and detailed estimate of building.

CO2   Understand the standard methods for working out quantities in estimating.

CO3   Evaluate the valuation of building for different specifications and create new technologies to

develop concrete estimating methods

CO4   Rate analysis - Working out data for various items of work over head.

CO5   To understand method of valuation of building.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	8
2	Types of estimate & cost of works	9
3	Estimates	9
4	Rate Analysis	8
5	Valuation	9

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction**
	Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking outquantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities.
2	**Types of estimate & cost of works**
	Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementaryestimates for different projects.
	Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.
3	**Estimates**
	Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth workcalculations for roads and estimating of culverts, Services for building such as water supply, drainage and electrification
4	**Rate Analysis**
	Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work. Current schedule ofrates. (C.S.R.), Basic schedule of rates.(B.S.R.)
5	**Valuation**

	Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dualrate interest, methods of valuation, rent fixation of buildings.

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Publication
1	Estimating & Costing in Civil Engineering	B.N. Dutta and S. Dutta	CBS Publishers
2	Estimating & Costing (Civil)	D.D. Kohli,	S. Chand Publishing, 2012

Websites
• https://theconstructor.org/practical-guide/quality-control/
• https://en.wikipedia.org/wiki/Estimation

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code: BCVECV7112	GROUND IMPROVEMENT TECHNIQUES	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1	Demonstrate collapsible soil, expansive soil, reclaimed soil, sanitary land fill, ground improvements and principles of compaction.
CO2	Analyze ground improvement in granular soil, compaction piles in sand, vibro compaction piles, dynamic compaction and blasting.
CO3	Investigate compressibility vertical and radial consolidation, rate of consolidation, vertical drains, load carrying capacity and settlement of foundation.
CO4	Examine ground improvement by grouting and soil reinforcement.
CO5	Select soil stabilization technique such as lime stabilization, cement stabilization, fly ash-lime stabilization and soil bitumen stabilization.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	6
2	Ground Improvement in Granular soil	8
3	Ground improvement in Cohesive soil	8
4	Ground Improvement by Grouting & Soil Reinforcement	8
5	Soil Stabilization	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction**
	Introduction: Formation of soil, major soil types, Collapsible soil, expansive soil, reclaimed soil,sanitary land fill, Ground improvements; objective, potential **General principles of compaction:** Mechanics, field procedure, quality control in field.
2	**Ground Improvement in Granular soil**
	Ground Improvement in Granular soil: In-place densification by Vibro floatation, Compaction piles in sand, Vibro compaction piles, Dynamic compaction, Blasting.
3	**Ground improvement in Cohesive soil**
	Preloading with or without vertical drains. Compressibility vertical and radial consolidation, Rate ofconsolidation, Preloading methods. Types of drains, Design of vertical drains, Construction techniques, Stone column: Function, Design principles, load carrying capacity, construction techniques, Settlement of stone column foundation.
4	**Ground Improvement by Grouting & Soil Reinforcement**
	Grouting in soil: Types of grout, desirable characteristics, Grouting pressure, Grouting methods , SoilReinforcement – Mechanism, Types of reinforcing elements, Reinforcement-Soil interaction, Reinforced soil application beneath roads, foundation and retaining wall.

5	Soil Stabilization
	Lime Stabilization – Base Exchange mechanism, Pozzolonic reaction, lime-soil interaction, limecolumns, Design of foundation on lime column.
	Cement stabilization-Mechanism, amount, Age and curing, Fly ash-Lime stabilization, Soil bitumen stabilization.

Websites

- https://nptel.ac.in/content/syllabus_pdf/105108075.pdf
- https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105108075/lec3.pdf
- http://www.cdeep.iitb.ac.in/webpage_data/nptel/Civil%20Engineering/Foundation_Engineering/Course _hom e36.1.html
- http://www.cdeep.iitb.ac.in/webpage_data/nptel/Civil%20Engineering/Foundation_Engineering/Course _hom e36.1.html

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code: BCVECV7113	GROUND WATER CONTAMINATION	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	6
2	**Occurrence and movement of ground water**	8
3	**Resource Evaluation**	8
4	**Ground water quality standards**	8
5	**Water testing for contaminates**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction**
	Ground water and the hydrologic cycles- Ground water as a resource- Ground water contamination- Ground water as a geotechnical problem- Ground water and geologic processes Physical properties and principles- Darcy's law- Hydraulic head and fluid potential- Piezometers and nests.
2	**Occurrence and movement of ground water**
	Hydraulic conductivity and permeability- Homogeneity and anisotropy- Porosity and voids ratio Unsaturated flow and the water table- Steady state flow and transient flow- Compressibility and effective stress- Transmissivity and storativity- Equations of ground water flow – Limitations of Darcian Approach- Hydro dynamic dispersion.
3	**Resource Evaluation**
	Development of ground water resources- Exploration of Aquifers- The response of ideal aquifers to pumping- Measurement of parameters- Laboratory tests- Numerical simulation for aquifer yield prediction- Artificial recharge and induced infiltration- Land subsidence- Sea water intrusion.
4	**Ground water quality standards**
	• Water quality indicators • Safe Drinking Water Act (SDWA) • Drinking water quality regulations • Contaminants & their maximum contaminant levels (MCLs)
5	**Water testing for contaminates**
	Water testing parameters: ¬ Microorganisms; ¬ Disinfectants/disinfection byproducts; ¬ Radionuclides; ¬ Nitrates; ¬ Pesticides; ¬ Heavy metals; ¬ Volatile Organic Chemicals contaminants; ¬ pH ¬ Salinity ¬ Turbidity / total dissolved solids

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code:BCVCBX7109	**Principle of Finance**	2 Credit [LTP: 2-0-0]

Course Outcomes:

On successful completion of the course the learner will be able to

CO	Cognitive Abilities	Course Outcomes
CO.1	ANALYZE	ANALYZE the basic concepts in finance and implication of finance on business
CO.2	EVALUATING	Evaluate various types of internal sources of finance & their importance, applications for a business organization.
CO.3	Apply	Apply various types of external sources of finance & their importance, applications for a business organization
CO.4	Analyzing	ANALYZE the constituents of capital structure, factors affecting capital structure & implications of constituents on business organization.
CO.5	Analyzing	ANALYZE recent trends in business finance & current issues related to them.

Syllabus:

1.   Basic concepts in finance:

Definition - Nature and scope of finance function, Financial Management - Meaning – Approaches: - Traditional, Modern and Role of finance manager in traditional & modern era.

2.   Sources of Finance -I:

Internal: - Reserves and surplus, Bonus shares & Retained earnings- meaning, types, advantages and limitations of these sources.

3.   Sources of Finance -II:

External: - Shares, Debentures, Public Deposits, borrowing from banks: - meaning, types, advantages and limitations of these sources

4.   Capital Structure:

Meaning criteria for determining capital structure, Factors affecting capital structure, Capitalization: - Meaning, Over capitalization and Under Capitalization - meaning, causes, consequences and remedies.

5.   Recent Trends in business finance:

Meaning and nature of Venture Capital, Leasing, Microfinance and Mutual Fund.

> **Teaching Pedagogy**:

Unit	Tools	Expected Outcome
Unit 1	➢ Power Point Presentation	➢ Understand the concept of Financial Management. ➢ Students will be acquainted with basic finance functions & role of finance manager.
Unit 2	➢ Power Point Presentation	➢ Students will develop rational understanding regarding role and utility of different sources of internal finance ➢ Understand the comparative analysis of various sources of internal finance.
Unit 3	➢ Power Point Presentation	➢ Students will understand the comparative analysis of various sources of external finance. ➢ Understand the Financial institutions who provide sources of finance
Unit 4	➢ Power Point Presentation ➢ Case Studies	➢ Analyse the rational of sound capital structure of a business organization. ➢ Students will be able to prepare report on assessment of capital needs of a business organization. ➢ Understand the implications of over or under capitalization of business organization.
Unit 5	➢ Power Point Presentation ➢ Case Studies	➢ Understand the concept & issues of Venture Capital, Leasing, Microfinance, Mutual Fund ➢ Analyze their role/ contributions to the business organizations & economy.

> **Recommended Study Material**

S. No	Title of the Book	Authors	Publication
01	Financial management – Theory and Practice	Prasanna Chandra	McGraw Hill Education
02	Financial Management	I.M. Pandey	Vikas Publishing House Pvt. Ltd.
03	Financial Management	Rajiv Srivastava &Anil Misra	Oxford – University Press
04	Financial Management	P.V. Kulkarni &B.G.Satyaprasad	Himalaya Publishing House
05	Fundamentals of Financial management	James C. Van Horne , John M. &Wachowicz , JR	Prentice Hall of India Pvt. Ltd.
06	Financial management Comprehensive Text Book with Case Studies	Ravi M. Kishore	Taxmann's
07	Financial management – recent Trends In Practical Application	Chandra Hariharan Iyer	International Book House Pvt.Ltd
08	Basic Financial Management	M .Y Khan & P.K Jain	Mc Graw Hill Education

	POORNIMA UNIVERSITY, JAIPUR							
	Faculty of Engineering and Technology							
	Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 174							
	Teaching Scheme for Batch 2023-27							
	Semester-VIII							
Course Code	**Name of Course**	**Teaching Scheme**			**SH**	**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorial (T)**	**Practical (P)**		**IE**	**ESE**	**Total**	
A.	**Major (Core Courses)**								
A.1	**Theory**								
BCVCCV8101	Construction Planning & Management	3	0	0		40	60	100	3
BCVCCV8102	Geotechnical Engg-II	3	0	0	1*	40	60	100	3
A.2	**Practical**								
BCVCCV8201	Geotechnical Egg-II Lab	0	0	2		60	40	100	1
BCVCCV8202	Academic Research Paper Writing and IPR	0	0	2		60	40	100	1
BCVCCV8203	Valuation of Building Structure	0	0	2		60	40	100	1
B.	Minor Stream Courses/**Department Electives**								
B.1	**Theory**								
BCVECV8111	E-waste Utilization in Construction Industry	3	0	0		40	60	100	3
BCVECV8112	Plastic Waste Management								
BCVECV8113	Solid Waste Management								
B.2	**Practical**								
C	**Multidisciplinary Courses**								
		-	-	-					
D	**Ability Enhancement Courses (AEC)**								
		-	-	-					
E	**Skill Enhancement Courses (SEC)**								
		-	-	-					
F	**Value Added Courses (VAC)**								
		-	-	-					
G	**Summer Internship / Research Project / Dissertation**								
BCVCCV8301	Major Project			20		60	40	100	10
	Total	9		26	1				**22**
	Total Teaching Hours	**30/36**							

SH: Supporting Hours
*Classes will be conducted fortnightly.

Code: BCVCCV8101	CONSTRUCTION PLANNING & MANAGEMENT	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1	Apply the business and management skills in positions within the construction industry.
CO2	Analyze, evaluate, and select computer applications for the purpose of efficient and effective projectmanagement.
CO3	Apply professional and ethical standards of behavior in dealing with all stakeholders in the Construction process.
CO4	Apply the risk management plan and analyze the role of stakeholders.
CO5	Interpret safety and other aspects of construction management.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Financial evaluation of projects and project planning	8
2	Project scheduling	8
3	Project cost and time control	8
4	Contract management	6
5	Safety and other aspects of construction management	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Financial evaluation of projects and project planning**
	Introduction, Financial evaluation of projects and project planning: Capital investment proposals, criterions to judge the worth, wholeness of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure, Categories of construction projects. Objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process & objectives of construction project management.
2	**Project scheduling**
	Project scheduling: Importance of project scheduling, project work breakdown process determining activities involved, work breakdown structure, Assessing activity duration, duration estimate procedure, Project work scheduling. **Project management techniques** – CPM and PERT networks analysis, Concept of precedence networkanalysis.
3	**Project cost and time control**
	Project cost and time control: Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, Determination of the optimum duration of a project, Updating of project networks, resources allocation.

4	**Contract management**
	Introduction, Contract management: Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, Determination of a contract, arbitration.
5	**Safety and other aspects of construction management**
	Introduction, Safety and other aspects of construction management: Causes and prevention of accidents at construction sites, Safety measures to be followed in various construction works like excavation, Demolition of structures & explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system, Environmental and social aspects of various types of construction projects.

C. RECOMMENDED STUDY MATERIAL

S. No	Title of Book	Author	Edition	Publication
1	Construction equipment and Job planning	Dr. S.V. Deodhar	Latest	Khanna Publishers
2	Construction Project Management	K KChitkara	Third	McGraw Hill Publishers
3	Construction planning and Management	U.K. Shrivastava	Latest	Galgotia Publications
4	Construction cost & Management	Keith Potts	Second	Taylor & Francis
5	Construction Planning & Management	Gehlot and Dhir	First	New Age International (P) Ltd
6	Construction Engineering & Management	S. Seetharaman	Latest	Umesh Publications

D. CO and PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code: BCVCCV8102	**GEOTECHNICAL ENGINEERING II**	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1	Evaluate stresses in soil under surface loadings by Bossinesq's, Westerguard's, Newmark's chart and Fensk's methods of analysis.
CO2	Apply the concept of compressibility and consolidation under spring analogy and Terzaghi's onedimensional consolidation theory.
CO3	Analyze classifications of slopes and stability analysis by Swedish and friction circle method, Taylor stability number curves and Bishop's method.
CO4	Demonstrate the earth pressure theory through Rankine's and Coulomb's theories and evaluatewith Rebhann's and Culman's graphical methods
CO5	Interpret the bearing capacity of shallow foundation at eccentric loadings and water level conditions Rankine's, Skempton's and IS code method.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Stresses in Soil under surface loading	7
2	Compressibility and Consolidation	8
3	Stability of Slopes	7
4	Earth Pressure	7
5	Bearing Capacity of Soils	7

Unit	Unit Details
1	Introduction to Scope of Subject
	Stresses in Soil under surface loading: Bossinesq's and Westergaard's analysis for vertical pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Horizontal and shear stresses due to concentrated loads. Isobar diagram, Vertical stress distribution on a horizontal plane. Influence diagram Vertical stresses at point under line load and strip load. Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of obtaining vertical pressure due to surface loading. Newmark's chart, Fensk's Chart. Pressure bulb and its significance in Foundation exploration. Contact pressure below foundations.
2	Compressibility and Consolidation:
	Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Preconsolidation pressure and its determination. Normally, Over and Under consolidated soils. Methods of computation of Settlement and its rate. Coefficient of consolidation for layered soil. Total and differential Settlement. Preconsolidation pressure and its determination. Normally, Over and Under consolidated soils. Methods of computation of Settlement and its rate. Coefficient of consolidation for layered soil. Total and differential Settlement.
3	Stability of Slopes
	Classifications of slopes, Stability analysis of infinite slopes. Stability analysis of finite slopes by Swedish and Friction circle method. Stability analysis by Taylor's stability number, Taylor stability number curves. Stability of slopes of earthen embankments under sudden draw down, steady seepage and during construction. Bishop's method of stability analysis.

4	Earth Pressure:
	Active, passive and earth pressure at rest. Rankine's and Coulomb's theories of earth pressure. Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesion less back fill. Earth pressure on cantilever sheet piles Stability analysis of retaining walls.
5	Bearing Capacity of Soils
	Terminology related to bearing capacity, Common types of foundations. Terzaghi and Meyehoff's theory for bearing capacity. Rankine's method for minimum depth of foundation. Skempton's method. Effect of eccentricity and water table on bearing capacity. Plate load and penetration tests for determining bearing capacity. Introduction to pile, well and machine Foundations.

B. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Edition	Publication
1	Engineering in Theory & Practice Vol. I	Alam Singh,	Second	CBS Publishers & Distributers, Delhi.
2	Geotechnical Engineering	Purushottam Raj,	First	Tata McGraw Hills, Delhi.
3	Soil Mechanics in Engineering Practices	Terzaghi& Peck,	Latest	John Wiley & Co.
4	Soil Mech. & Foundation Engg	K.R. Arora,	Latest	Standard Publishers & Distributers, Delhi.
5	Theory & Practice Of Foundation Design	Som& Das,	Latest	PRENTICE Hall of India Delhi (PHI).
6	Soil Mechanics in Engineering and Practice	Terzaghi,	Latest	CBS Publishers and Distributors.
List of Weblinks /Journals/Periodicals/Magazines/Newspapers				
Indian Geotech Journal /Indian Geotechnical Society. ● www.igs.org.in ● https://nptel.ac.in/courses/105105168/ ● https://nptel.ac.in/courses/105101201/ ● https://nptel.ac.in/courses/105105185/ ● https://nptel.ac.in/courses/105103097/				

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1. To determine the differential free swell index of soil.

CO2. To determine the grain size distribution of fine grained soil by Hydrometer.

CO3. To determine the CBR of soil.

CO4. To determine the compressibility parameters of soil by consolidation test.

CO5. To determine the swelling pressure of soil.

LIST OF EXPERIMENTS

1. To determine the differential free swell index of soil.

2. To determine the compressibility parameters of soil by consolidation test.

3. To determine the swelling pressure of soil.

4. To determine the shear strength parameters of soil by tri-axial test.

5. To determine the permeability of soil by constant and falling head methods.

6. To determine the CBR of soil.

7. To determine the grain size distribution of fine grained soil by Hydrometer.

VIRTUAL LABS

- https://www.youtube.com/watch?v=XHpJa0Gl9a8
- https://www.youtube.com/watch?v=fCmMW73rP64
- https://www.youtube.com/watch?v=bmpn5oNDvOs

A. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

| Code: BCVCCV8202 | ACADEMIC RESEARCH PAPER WRITING & IPR | 1 Credits [LTP: 0-0-2] |

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1. Formuate Research Problem

CO2. Analyze literature review and find research gaps to finalize research objectives.

CO3. Identify the need of ethics in research

CO4. Identify the need of IPR of research projects for economic growth and social benefits.

CO5. Apply basic data analytics techniques: probability distribution, linear regression.

LIST OF EXPERIMENTS
1. Introduction to Research, Identify Requirements for evaluation/review, sources.
2. Literature Review
3. Identifying Gaps, - Learn to Critique existing knowledge and how to find the gap
4. Formulate the Problem Statement - Understand what should be the key aspects of your problem statement, your problem statement, examples of effective and ineffective Titles
5. Finding Good Literature Decide which sources you will need - Differentiate between journals, conferences, books, magazines and their quality, understand how to establish their quality and authenticity.
6. Writing and Presenting your Work Effective technical writing - How to write Report, Paper, Developing a Research Proposal, Format of research proposal.
7. Intellectual Property Patents, Designs, Trade and Copyright - Process of Patenting and Development: Technological research innovation, patenting, development.
8. New Developments in IPR - Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies

A. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

| Code: BCVCCV8203 | VALUATION OF BUILDING STRUCTURE | 1 Credits [LTP: 0-0-2] |

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO1 Understand the preparation of an Abstract Estimate and detailed estimate of building.

CO2 Understand the standard methods for working out quantities in estimating.

CO3 Evaluate the valuation of building for different specifications and create new technologies to develop concrete estimating methods

CO4 Rate analysis - Working out data for various items of work over head.

CO5 To understand method of valuation of building.

LIST OF EXPERIMENTS
1. Preliminary Estimate (Plinth Area and Cubic Content)
2. Detailed Estimate of buildings (Long wall-Short wall and Centre line method)
3. Definition and Purposes of Valuation
4. Methods of Valuation of Buildings and Properties
5. Methods of Buying and selling a Property
6. Rents fixation of a Building
7. Calculation of Valuation of Building or Property (Case Study)
8. Determination of Depreciation of Engineering Structure
9. Specifications- For different classes of building and Civil Engineering works
10. Specifications of building components

A. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

| Code: BCVECV8111 | E-WASTE UTILIZATION IN CONSTRUCTION INDUSTRY | 3 Credits [LTP: 3-0-0] |

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1	Examine composition and properties of plastic waste.
CO2	Understand the environmental impacts of e-waste
CO3	Apply concepts of e-waste management hierarchy
CO4	Distinguish the role of various national and internal act and laws applicable for e-waste ;ement and handling.
CO5	Analyze the e – waste management measures proposed under national and global legislations.

Unit	Unit Details
1.	**Introduction**
	E- waste; composition and generation. Global context in e- waste; E-waste pollutants, E waste hazardous properties, Effects of pollutant (E- waste) on human health and surrounding environment, domestic e-waste disposal, Basic principles of E waste management, Component of E waste management, Technologies for recovery of resources from electronic waste, resource recovery potential of e-waste, steps in recycling and recovery of materials-mechanical processing, technologies for recovery of materials, occupational and environmental health perspectives of recycling e-waste in India
2.	**E-Waste Hazardous on Global Trade**
	Essential factors in global waste trade economy, Waste trading as a quint essential part of electronic recycling, Free trade agreements as a means of waste trading. Import of hazardous e-waste in India; India's stand on liberalizing import rules, E-waste economy in the organized and unorganized sector. Estimation and recycling of e-waste in metro cities of India.
3.	**E-waste control measures**
	Need for stringent health safeguards and environmental protection laws in India, Extended Producers Responsibility (EPR), Import of e-waste permissions, Producer-Public-Government cooperation, Administrative Controls & Engineering controls, monitoring of compliance of Rules, Effective regulatory mechanism strengthened by manpower and technical expertise, Reduction of waste at source.
4.	**E- Waste Rules**
	E-waste (Management and Handling) Rules, 2011; and E-Waste (Management) Rules, 2016 - Salient Features and its likely implication. Government assistance for TSDFs..
5.	**Legislation and Convocation**
	The international legislation: The Basel Convention; The Bamako Convention. The Rotterdam Convention. Waste Electrical and Electronic Equipment (WEEE) Directive in the European Union, Restrictions of Hazardous Substances (RoHS) Directive

A. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	E-waste: implications, regulations, and management in India and current global best practices	Johri R.	Latest	TERI Press, New Delh
2.	Electronic Waste Management	Hester R.E., and Harrison R.M	Latest	Butterworth-Heinemann Ltd (January 1983)
3.	Solid Waste Management	P AarneVesilig	Latest	Cengage Learning CustomPublishing
4.	Environmental Engineering	Mackenzie L Davis, David A Cornwell	Latest	McGraw-Hill Inc.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

| Code: BCVECV8112 | PLASTIC WASTE MANAGEMENT | 3 Credits [LTP: 3-0-0] |

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1 Examine composition and properties of plastic waste.

CO2 Interpret plastic waste generation, solid plastic quantities and process of collection.

CO3 Demonstrate processing of waste separation and handling of plastic waste at residence e.g.
e, conveying, compacting, Shredding, pulping, granulating etc.

CO4 Distinguish among disposal processes of plastic.

Analyze the characteristics of plastic waste such as toxicity, reactivity, infectiousness,

CO5 Flammability, radioactivity, corrosiveness, irritation, bio-concentration, genetic activity and
iveness.

Unit	Unit Details
1.	**Introduction**
	Plastic waste, 3R of plastic waste, types of plastic waste materials and their categorization. Alternative of plastic materials, how to reduce the use of plastic,degradable and non degradable plastic materials
2.	**Plastic Material Risk Management**
	Reuse and risk management of plastic material, safety grading of plastic, plastic material used for packaging of food products. Recycle and management of plastic materials, recyclable and non recyclable plastic material, process of recycle, equipment required, methods and application.
3.	**Significance of 3R**
	Prevention, minimization and disposable of plastic waste materials,s ignificance of reduce, reuse and recycle of plastic waste. Economics of plastic processing, equipment cost, production rate,tooling cost and build volume
4.	**Molding of Waste**
	Molding of plastic waste materials, compression molding, transfer molding, rotational molding, blow molding, thermoforming, casting and foam molding. Degradable and non-degradable products, addition of extraneous materials, Incineration of plastics.
5.	**Energy Recovery**
	Energy recovery from plastics waste, social concern and safety issues,targeted population / customers for the developed products

B. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Transforming Plastic: From Pollution to Evolution	Bates, A	Latest	GroundSwell Books
2.	Disposal and recovery of municipal solid waste	Michael E Henstock	Latest	Butterworth-Heinemann Ltd (January 1983)
3.	Solid Waste Management	P AarneVesilig	Latest	Cengage Learning CustomPublishing
4.	Environmental Engineering	Mackenzie L Davis, David A Cornwell	Latest	McGraw-Hill Inc.

A. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

Code: BCVECV8113	SOLID WASTE MANAGEMENT	3 Credits [LTP: 3-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO1	Examine composition and properties of municipal solid waste.
CO2	Interpret solid waste generation, solid waste quantities and process of collection.
CO3	Demonstrate processing of waste separation and handling of solid waste at residence e.g. Storage, conveying, compacting, Shredding, pulping, granulating etc.
CO4	Distinguish among disposal processes of municipal solid wastes like combustion, landfill, and Biochemical processes.
CO5	Analyze the characteristics of hazardous solid waste such as toxicity, reactivity, infectiousness, Flammability, radioactivity, corrosiveness, irritation, bio-concentration, genetic activity and explosiveness.

A.   OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Composition and Properties of Municipal Solid Waste	8
2	Solid Waste Generation and Collection	6
3	Separation and Processing of Solid Waste	8
4	Disposal of Municipal Solid Waste	6
5	Hazardous Solid Waste	8

B.   DETAILED SYLLABUS

Unit	Unit Details
1.	**Composition and Properties of Municipal Solid Waste**
	Introduction, Sources of solid waste, Types of solid waste. Composition of solid waste and its determination. Types of materials recovered from Municipal solid waste (MSW). Physical, Chemicaland Biological and properties of Municipal Solid Waste, Transformation of Municipal Solid Waste.
2.	**Solid Waste Generation and Collection**
	Introduction, Measurements, and methods to measure solid waste quantities. Solid waste generationand collection. Factors affecting solid waste generation rate. Quantities of materials recovered from MSW.
3.	**Separation and Processing of Solid Waste**
	Introduction, Handling and separation of solid waste At site. Material separation by pick in, screens, float and separator magnets and electromechanical separatorand other latest devices for material separation. Processing of solid waste at residence e.g. Storage, conveying, compacting, Shredding, pulping, granulating etc. Processing of solid waste at Commercial and industrial site.
4.	**Disposal of Municipal Solid Waste**
	Introduction, Combustion and energy recovery of municipal solid waste, Effects of combustion, undesirable effects of Combustion. **Landfill:** Classification, planning, sitting, permitting, landfill processes, landfill design, landfill operation, use Of old landfill. Differentiate sanitary land fill and incineration as final disposal system for solid waste **Biochemical processes:** Methane generation by anaerobic digestion, composting and other biochemical Processes.

5.	**Hazardous Solid Waste**
	Introduction, Definition, identification and classification of hazardous solid waste. Characteristics Hazardous waste toxicity, reactivity, infectiousness, flammability, radioactivity, corrosiveness, irritation, bio-concentration, genetic activity, explosiveness. Bio-medical waste, its sources, generation, storage, transportation and Disposal.

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Integrated Solid Waste Management	George Tchobanoglous and Hillary theisen, Samuel Vigil	Latest	McGraw Hill
2.	Disposal and recovery of municipal solid waste	Michael E Henstock	Latest	Butterworth-Heinemann Ltd (January 1983)
3.	Solid Waste Management	P AarneVesilig	Latest	Cengage Learning CustomPublishing
4.	Environmental Engineering	Mackenzie L Davis, David A Cornwell	Latest	McGraw-Hill Inc.
Websites				
https://nptel.ac.in/courses/120108005/ https://nptel.ac.in/courses/105/106/105106056/ https://nptel.ac.in/courses/105105160/				

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	2	-	1	1	1	-	-	-	-	1
CO.2	2	-	3	2	-	-	-	-	-	-	-	-
CO.3	-	1	1	-	2	2	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	-	-	3	-	2	2	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO.1	3		-	-	2
CO.2	-	-	2	2	2
CO.3	2		2	-	1
CO.4	2		-	2	-
CO.5	-		2	-	2

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO.1   Predict a problem of current relevance to society

CO.2   Formulate the problem and identify suitable modelling paradigm

CO.3   Categorize the problem and identify the solution methodology

CO.4   Simulate and design systems using various modern tools

CO.5   Validate the results and prepare a project report

GUIDE LINES:

1. The Project group in seventh term will continue the project work in eighth term and complete projectin all respect (assembly, testing, fabrication, tabulation, test result etc.)

2. The group should maintain a log book of activities. It should have entries related to the worked one,problems faced, solution evolved etc., duly signed by guide.

3. The guides should regularly monitor the progress of the project work.

4. The project work along with project report should be submitted as part of term work in eighth term onor before the last day of the eighth term.

5. Project report must be submitted in the prescribed format only. No variation in the format will beaccepted.

6. Assessment of the project forward of marks shall be done by the guide and a departmental committee.

7. The guide should be internal examiner for oral examination.

8. The external examiner should be from the related area of the concerned project. He should haveexperience at degree level / industry.

The evaluation at final oral examination should be done jointly by the internal and external examiner.

END

HUMAN BEHAVIOR

Semester	I	Specialization	
Course code	GC-014	Type	Major
Credit	3	Pattern (L:T:P)	3:0:0
Course Title	Human Behavior	No. of Hours	40

Course Outcomes:

On successful completion of the course the learner will be able to

CO	Cognitive Abilities	Course Outcomes
CO.1	Remembering	Define the various concepts and theories of Personality
CO.2	Understanding	To understand different approaches to learning and motivation and related theories for developing understanding of factors of motivation.
CO.3	Analyzing	Analyze the concept of perception and its process and how it influences experience.
CO.4	Creating	To Create application for process of decision making for knowing how to take rational decisions in different situations.
CO.5	Evaluating	Evaluate varied attitudes, values and emotions. Understanding the interplay of values and emotions in different cultural setups for achieving organizational objectives

Syllabus:

1.   Personality:
Definition, personality determinants, trait theory, type theory, Sheldon's theory, Freud's psychoanalytical theory. Major Personality attributes influencing organizational behavior, Personality-job fit. (7+1 Hrs)

2.   Learning & Motivation:
Definition, Classical conditioning, instrumental conditioning. Motivation-Meaning, Motivation cycle, Maslow's Theory, Herzberg's Theory, ERG Theory, Theory X and Y, McClelland's Achievement Theory. (7+1 Hrs)

3.   Perception:
Difference between perception and sensation, Process, perceptual distortion, attribution theory, Application in organization. (7+1 Hrs)

4.   Decision Making:

Meaning, process, Effect of perception on decision making, situations in decision making, Rationality and Bounded rationality. (7+1 Hrs)

5. Attitude, Values and Emotions:

Meaning, Types of attitude, Cognitive dissonance theory, Measuring the A-B relationships-moderating variables, Self-perception theory.; Values- Definition, types of values, values across cultures ;Emotions - Meaning, emotional labor, felt vs. displayed emotions, emotion dimensions, external constraints on emotions, application of emotions in organizational context. (7+1 Hrs)

➢ **Recommended Study Material**

S. No	Title of the Book	Authors	Publication
01	Organizational Behavior, (1 ed.),	Prasad, L. M.	Sultan Chand and Sons (2015)
02	Organizational Behavior	Gupta, Shashi K and Joshi, Rosy. (2015)	Kalyani Publishers
03	Organizational Behavior, (15 ed.)	Robbins, Stephen, Judge, T. A. and Vohra, N. (2015)	Pearson
04	Understanding Organizational Behavior, (3ed.),	Pareek, Udai (2011)	Oxford University Press
05	Organizational Behavior, (2ed),	Bhattacharyya, Dipak Kumar (2016)	Oxford University Press

FUNDAMENTALS OF MARKETING-I

Semester	I	Specialization	
Course code	SC-01	Type	Major
Credit	2	Pattern (L:T:P)	2:0:0
Course Title	Fundamentals of Marketing	No. of Hours	40

Course Outcomes:

On successful completion of the course the learner will be able to

CO-1	UNDERSTAND the various concepts, terms in marketing and the various company orientations towards the market place.
CO-2	APPLY the concept and theories of Segmentation, targeting and positioning to the actual market situations
CO-3	EXPLAIN the concept of marketing mix and DEVELOP the applications for real world market offerings
CO-4	EVALUATE various Product Mix and Price Mix of real world market offering
CO-5	EVALUATE various Place Mix and Promotion Mix of real world market offering

OUTLINE OF THE COURSE:

Unit No.	Title of the unit	Time required for the unit(Hours)
1.	**Introduction to Market and Marketing**	**8**
2.	**Market Segmentation**	**8**
3.	**Marketing Mix**	**8**
4.	**Product Mix and Price Mix**	**8**
5.	**Place Mix and Promotion Mix**	**8**

Detailed Syllabus

Unit	Contents
1.	**Introduction to Market and Marketing**
	Meaning and Definition of Market; Classification of Markets; Marketing Concept: Traditional and Modern; Importance of Marketing; Functions of Marketing: Buying, Selling, Assembling, Storage, Transportation, Standardization, Grading, Branding, Advertising, Packaging, Risk Bearing, Insurance, Marketing Finance, Market Research and Marketing Information.; Selling vs. Marketing
2.	**Market Segmentation, Targeting & Positioning**
	Market Segmentation: Introduction, Meaning and Definition, Importance, Limitations; Bases for Segmentation. Targeting and Positioning strategies.
3.	**Marketing Mix**
	Marketing Mix: Introduction, Meaning & Definition; Elements of Marketing Mix- Product, Price, Place and Promotion; Importance of Marketing Mix
4.	**Product Mix and Price Mix**
	(A) Product Mix: Meaning and Definition , Product Line and Product Mix, Product Classification, Product Life Cycle, Factors Considered for Product Management
	(B) Price Mix: Meaning and Definition , Pricing Objectives, Factors Affecting Pricing Decision , Pricing Methods

5.	Place Mix and Promotion Mix
	(A) Place Mix: Meaning and Definition of Place Mix , Importance , Types of Distribution Channels – consumer goods and Industrial Goods, Factors Influencing selection of Channels
	(B) Promotion Mix: Meaning of Promotion Mix, Elements of Promotion Mix- Personal Selling, Public Relation and Sales Promotion, Factors Affecting Market Promotion Mix, Promotion Techniques or Methods

Recommended Study Material

S. No	Title of the Book	Authors	Publication
01	Marketing Management	Philip Kotler	Pearson Publication
02	Marketing Management	Rajan Saxena	McGraw Hill Education
03	Principles of Marketing	Philip Kotler	Pearson Publication
04	Sales & Distribution Management	Tapan K Panda	Oxford Publication
05	Advertising Management	Rajiv Batra	Pearson Publication
06	Retail Management	Swapna Pradhan	McGraw Hill Publication
07	Retail Management	Gibson Vedamani	Jayco Publication
08	Marketing Management	V. S. Ramaswamy& S. Namakumari	Macmillan Publication

COs AND POs Mapping

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO.1	2	2	1	2	1	2	-
CO.2	1	3	-	2	1	-	-
CO.3	1	-	-	3	1	-	1
CO.4	1	1	2	-	-	-	1
CO.5	1	1	2	-	1	1	-

COs AND PSOs MAPPING

COs and PSOs	BA		DM		FM	
	PSO1	PSO2	PSO1	PSO2	PSO1	PSO2
CO.1	-	-	-	-	-	-
CO.2	-	-	-	-	-	-
CO.3	-	-	2	-	-	-
CO.4	-	-	-	-	-	-
CO.5	-	-	-	1	-	-

Skill Development Activities:

(These activities are only indicative; the Faculty member can innovate)

1. Visit any website and list the promotion strategy of a sponsoring company.

2. Find out the promotion tools of any company.

3. Observe the Distribution Network of a Company

4. List out Product Line of a company and note line modernization or deletion.

5. Draw a Product Life Cycle with regard to a particular product of a company and observe its extension.

PRINCIPLES OF FINANCE

Semester	II	Specialization	
Course code	GC-06	**Type**	Minor
Credit	3	**Pattern (L:T:P)**	3:0:0
Course Title	Principles of Finance	**No. of Hours**	40

Course Outcomes:

On successful completion of the course the learner will be able to

CO	Cognitive Abilities	Course Outcomes
CO.1	ANALYZE	ANALYZE the basic concepts in finance and implication of finance on business
CO.2	EVALUATING	Evaluate various types of internal sources of finance & their importance, applications for a business organization.
CO.3	Apply	Apply various types of external sources of finance & their importance, applications for a business organization
CO.4	Analyzing	ANALYZE the constituents of capital structure, factors affecting capital structure & implications of constituents on business organization.
CO.5	Analyzing	ANALYZE recent trends in business finance & current issues related to them.

Syllabus:

1.   Basic concepts in finance :

Definition - Nature and scope of finance function, Financial Management - Meaning – Approaches: - Traditional, Modern and Role of finance manager in traditional & modern era.

2.   Sources of Finance -I :

Internal: - Reserves and surplus, Bonus shares & Retained earnings- meaning, types, advantages and limitations of these sources.

3.   Sources of Finance -II :

External: - Shares, Debentures, Public Deposits, borrowing from banks: - meaning, types, advantages and limitations of these sources

4.   Capital Structure :

Meaning criteria for determining capital structure, Factors affecting capital structure, Capitalization: - Meaning, Over capitalization and Under Capitalization - meaning, causes, consequences and remedies.

5.   Recent Trends in business finance :

Meaning and nature of Venture Capital, Leasing, Microfinance and Mutual Fund.

> **Teaching Pedagogy**:

Unit	Tools	Expected Outcome
Unit 1	➢ Power Point Presentation	➢ Understand the concept of Financial Management. ➢ Students will be acquainted with basic finance functions & role of finance manager.
Unit 2	➢ Power Point Presentation	➢ Students will develop rational understanding regarding role and utility of different sources of internal finance ➢ Understand the comparative analysis of various sources of internal finance.
Unit 3	➢ Power Point Presentation	➢ Students will understand the comparative analysis of various sources of external finance. ➢ Understand the Financial institutions who provide sources of finance
Unit 4	➢ Power Point Presentation ➢ Case Studies	➢ Analyse the rational of sound capital structure of a business organization. ➢ Students will be able to prepare report on assessment of capital needs of a business organization. ➢ Understand the implications of over or under capitalization of business organization.
Unit 5	➢ Power Point Presentation ➢ Case Studies	➢ Understand the concept & issues of Venture Capital, Leasing, Microfinance, Mutual Fund ➢ Analyze their role/ contributions to the business organizations & economy.

> **Recommended Study Material**

S. No	Title of the Book	Authors	Publication
01	Financial management – Theory and Practice	Prasanna Chandra	McGraw Hill Education
02	Financial Management	I.M. Pandey	Vikas Publishing House Pvt. Ltd.
03	Financial Management	Rajiv Srivastava &Anil Misra	Oxford – University Press
04	Financial Management	P.V. Kulkarni &B.G.Satyaprasad	Himalaya Publishing House
05	Fundamentals of Financial management	James C. Van Horne , John M. &Wachowicz , JR	Prentice Hall of India Pvt. Ltd.
06	Financial management Comprehensive Text Book with Case Studies	Ravi M. Kishore	Taxmann's
07	Financial management – recent Trends In Practical Application	Chandra Hariharan Iyer	International Book House Pvt.Ltd
08	Basic Financial Management	M .Y Khan & P.K Jain	Mc Graw Hill Education

FUNDAMENTALS OF MARKETING-II

Semester	II	Specialization	
Course code	SC-03	Type	Major
Credit	3	Pattern (L:T:P)	3:0:0
Course Title	Fundamentals of Marketing-II	No. of Hours	40

Course Outcomes:

On successful completion of the course the learner will be able to

CO	Cognitive Abilities	Course Outcomes
CO.1	Applying	EXPLAIN the concept of Salesmanship which is a vital aspect of marketing and UNDERSTAND the salesmanship as an art, science and a profession
CO.2	Applying	APPLY the concept and psychology of Salesmanship and get a knowhow of skills in the field of marketing by using various techniques of salesmanship.
CO.3	Evaluate	UNDERSTAND Rural Marketing and EVALUATE the Challenges and Opportunities in Rural Marketing in today's context.
CO.4	Evaluate	UNDERSTAND the concepts and EVALUATE recent trends in marketing such as Green marketing, digital marketing,etc.
CO.5	Evaluate	EVALUATE the concept, challenges and importance of E-marketing.

OUTLINE OF THE COURSE:

Unit No.	Title of the unit	Time required for the unit (Hours)
1.	Salesmanship	**8**
2.	Process of Selling	**8**
3.	Rural Marketing	**8**
4.	Recent Trends in Marketing	**8**
5.	E- Marketing	**8**

Detailed Syllabus:

Unit	Contents
1.	**Salesmanship**
	Meaning and Definition of Salesmanship, Features of Salesmanship, Scope of Salesmanship, Modern Concept of Salesmanship, Utility of Salesmanship, Elements of Salesmanship, Salesmanship : Arts or Science, Salesmanship – a Profession, Qualities of Salesman
2.	**Process of Selling**
	Psychology of Salesmanship – Attracting Attention, Awakening Interest, Creating Desire and Action, Stages in Process of Selling – Pre-Sale Preparations , Prospecting , Pre-Approach, Approach , Sales Presentation , Handling of Objections, Close , After Sales Follow-up.
3.	**Rural Marketing**
	Rural Marketing, Introduction, Definition of Rural Marketing, Features of Rural Marketing, Importance of Rural Marketing, Present Scenario of Rural Market, Challenges and Opportunities in Rural Marketing.
4.	**Recent Trends in Marketing**
	Digital Marketing , Green Marketing , Niche Marketing, Omni channel Marketing, Influencer Marketing , Relationship Marketing & Meta Marketing.
5	**E- Marketing**
	E-marketing, Social Media Marketing- Challenges and Opportunities

➢ **Recommended Study Material**

S. No	Title of the Book	Authors	Publication
01	Marketing Management	Philip Kotler	Pearson Publication
02	Marketing Management	Rajan Saxena	McGraw Hill Education
03	Principles of Marketing	Philip Kotler & Gary Armstrong	Pearson Publication
04	Sales & Distribution Management	Tapan K Panda	Oxford Publication
05	Advertising Management	Rajiv Batra	Pearson Publication
06	Retail Management	Swapna Pradhan	McGraw Hill Publication
07	Retail Management	Gibson Vedamani	Jayco Publication
08	Marketing Management	V. S. Ramaswamy & S. Namakumari	Macmillan Publication
09	Supply Chain Management	Sunil Chopra, Peter Meindl& D. V. Karla	Pearson Publication

COs AND POs Mapping

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO.1	3	2	1	2	1	2	-
CO.2	1	3	-	2	1	-	-
CO.3	1	-	-	3	1	3	_
CO.4	1	1	2	-	-	-	1
CO.5	1	1	3	-	1	1	-

COs AND PSOs MAPPING

COs and PSOs	BA		DM		FM	
	PSO1	PSO2	PSO1	PSO2	PSO1	PSO2
CO.1	_	-	-	-	-	-
CO.2	_	-	-	-	-	-
CO.3	_	-	-	-	-	-
CO.4	_	-	2	3	-	-
CO.5	_	-	2	2	-	-

Skill Development:
(These activities are only indicative, the Faculty member can innovate)
1. Collect five print ads of products, which are directed at the life style segments. Describe the lifestyle that these ads focus on.
2. Construct a brand personality inventory for two different brands in the same product category. Ask five of your friends to rate each brand on ten different personality dimensions. Do these brand personalities relate to the advertising strategies to differentiate these brands?
3. Interview 10 customers of FMCG brand ask them to note down the socio-cultural, psychological factors that influence them while buying FMCG.

| Code: | Principle of Human Recourse Management | 2 Credits [LTP: 2-0-0] |

Course Objectives:

CO1. To introduce the basic concepts of Human Resource Management.

CO2.To cultivate right approach towards Human Resource and their role in business.

CO3 To create awareness about the various trends in HRM among the students.

CO4 To create awareness about the organizational behavior.

CO5 To cultivate the right approach towards compensation management.

Unit No.	Title of the unit	Time Required for the Unit (Hours)
1.	**Introduction to HRM**	
2.	**Human Resources Planning**	
3.	**Performance Appraisal**	
4.	**Introduction to Organizational Behavior**	
5.	**Organizational Changes and Development**	

CO	Cognitive Abilities	Course Outcomes
CO.1	Analyzing	ANALYZE the basic need and concept of HRM
CO.2	EVALUATION	Evaluating the Objectives-Importance-HRP Process
CO.3	Analyzing	Evaluate the Methods of Training –Tools and Aids
CO.4	Analyzing	Analyze the Concepts and Ethics-Different methods of Performance Appraisal
CO.5	Evaluating	Evaluate about Concepts and Components-Job Evaluation- Incentives and Benefits-Superannuation.

Unit	Unit Details
1.	**Introduction to HRM**
	Introduction and Importance-Evolution –difference between Personnel Management and HRM- Strategic HRM- role of a HR Manager. HRD – Concept and Need
2.	**Human Resources Planning**
	Objectives-Importance-HRP Process- Manpower Estimation-Job analysis-Job Description-Job Specification. Recruitment-Sources of Recruitment-Selection Process-Placement and Induction-Retention of Employees.
3.	**Training and Development and Career Planning**
	Objectives and Needs-Training Process-Methods of Training –Tools and Aids-Evaluation of Training Programs. Succession Planning.
4.	**Performance Management System**
	Definition, Concepts and Ethics-Different methods of Performance Appraisal- Rating Errors-Competency management, Potential Appraisal
5.	**Compensation Management and Retirement**
	Concepts and Components-Job Evaluation- Incentives and Benefits-Superannuation-Voluntary Retirement Schemes-Resignation-Discharge-Dismissal-Suspension-Layoff.

Sr. No.	Title of the Book	Author/s	Publication	Place
1	Human Resource Management	L. M. Prasad	Sultan Chand & Company Ltd.	New Delhi
2	Human Resource Management	K. Ashwathappa	Tata McGraw Hill	New Delhi
3	Personnel Management	C. B. Mamoria	Himalaya Publishing House	Mumbai
4	Personnel & Human Resource Management	A. M. Sharma	Himalaya Publishing House	Mumbai
5	Human Resource Management	S. S. Khanka	Sultan Chand & Company Ltd.	New Delhi