FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

B. TECH.
(CIVIL ENGINEERING)
(CBEGS)

(SEMESTER: I – VIII)

BATCH FROM YEAR 2020 TO YEAR 2024

GURU NANAK DEV UNIVERSITY
AMRITSAR

SCHEME
SEMESTER –I

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CYL197	Engineering Chemistry	3	0	1	4
2.	MTL101	Mathematics-I	3	1	0	4
3.	ECL119	Basic Electrical &Electronics Engineering	4	0	1	5
4.	CSL126	Fundamentals of IT & Programming using Python	2	1	1	4
5.	ENL101	Communicative English	2	0	0	2
6.		Elective-I	2	0	0	2
7.	MEP101	Workshop Practices	0	0	2	2
8.	SOA-101	Drug Abuse: Problem, Management and Prevention- Interdisciplinary Course (Compulsory Paper)	2	0	0	2
List of Electives–I:						
1.	PBL121	Punjabi (Compulsory)**OR**	2	0	0	2
2.	PBL122*	ਮੁੱਢਲੀ ਪੰਜਾਬੀ	2	0	0	
3.	HSL101*	Punjab History & Culture (1450-1716) **OR**	2	0	0	
		Total Credits:	**18**	**2**	**5**	**27**

Note:

1. *** Special Paper in lieu of Punjabi Compulsory, for those students who are not domicile of Punjab.**
2. **Students are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.**

SEMESTER –II

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CEL120	Engineering Mechanics	3	1	0	4
2.	MEL120	Engineering Graphics & Drafting	2	0	2	4
3	MTL102	Mathematics-II	3	1	0	4
4.	PHL183	Physics	3	1	1	5
5.	MEL110	Introduction to Engg. Materials	3	0	0	3
6.		Elective-II	2	0	0	2
7.	PSL055	Human Rights and Constitutinal Duties (Comuplsory Paper)	2	0	0	2
List of Electives–II:						
1.	PBL131	Punjabi (Compulsory)**OR**	2	0	0	2
2.	PBL132*	ਮੁੱਢਲੀ ਪੰਜਾਬੀ	2	0	0	
3.	HSL102*	Punjab History & Culture (1717-1947) **OR**	2	0	0	
		Total Credits:	**18**	**3**	**3**	**24**

Note:

1. *** Special Paper in lieu of Punjabi Compulsory, For those students who are not domicile of Punjab**
2. **Students are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.**

Semester-III						
			Credits			
S. No.	**Subject Code**	**Subject**	**L**	**T**	**P**	**Marks**
1.	**CEL251**	Civil Engineering Materials	3	0	0	100
2.	**CEL252**	Concrete Technology	2	1	0	100
3.	**CEL253**	Surveying	3	1	0	100
4.	**CEL254**	Water Supply Engineering	3	1	0	100
5.	**ENL201**	Written Oral Technical Communication	2	1	0	100
6.	**MTL201**	Mathematics-III	3	1	0	100
7.	**ESL220**	*Environmental Studies (Compulsory Paper)	2	0	0	100
PRACTICALS						
1.	**CEP252**	Concrete Technology laboratory	0	0	1	100
2.	**CEP253**	Surveying Laboratory	0	0	1	100
3.	**ENP201**	Written and Oral Technical Communication	0	0	1	100
		Sub Total:	**18**	**5**	**3**	**1000**
		Grand Total:	**26**			

Semester-IV						
			Credits			
S. No.	**Subject Code**	**Subject**	**L**	**T**	**P**	**Marks**
1.	**CEL261**	Strength of Materials	3	1	0	100
2.	**CEL262**	Fluid Mechanics	3	1	0	100
3.	**CEL263**	Construction Planning Management	3	0	0	100
4.	**CEL264**	Soil Mechanics	3	1	0	100
5.	**CEL265**	Numerical Methods for Civil Engineering	2	1	0	100
Practical's						
1.	**CEP261**	Strength of Materials Laboratory	0	0	1	100
2.	**CEP262**	Fluid Mechanics Laboratory	0	0	1	100
3.	**CEP264**	Soil Mechanics Laboratory	0	0	1	100
		Sub Total:	**14**	**4**	**3**	**800**
		Grand Total:	**21**			

Semester-V						
			Credits			
S. No.	**Subject Code**	**Subject**	**L**	**T**	**P**	**Marks**
1.	**CEL351**	Theory of Structure-I	3	1	0	100
2.	**CEL352**	Design of Steel Structure-I	3	1	0	100
3.	**CEL353**	Water Resources Engineering-I	3	1	0	100
4.	**CEL354**	Railways Airport Engineering	3	0	0	100
5.		Department Elective-I	3	0	0	100
6.		Department Elective-I1	3	0	0	100
8.	**CEP361**	Survey camp of 04 weeks duration after 4th Semester	0	0	2	100
		Practical				
1.	**CEP351**	Theory of Structure-I Laboratory	0	0	1	100
		Sub Total:	**18**	**3**	**1**	**800**
		Grand Total:	**22**			
Department Elective-I						
1.	**CEL355**	Building Construction	3	0	0	100
2.	**CEL356**	Disaster Management	3	0	0	100
3.	**CEL357**	Mass Transportation System	3	0	0	100
Department Elective-II						
1.	**CEL358**	Traffic Engineering	3	0	0	100
2.	**CEL359**	Construction Laws	3	0	0	100
3.	**CEL360**	Advanced Environmental Engineering	3	0	0	100

Semester-VI						
			Credits			
S. No.	**Subject Code**	**Subject**	**L**	**T**	**P**	**Marks**
1.	**CEL381**	Highways Engineering	2	1	0	100
2.	**CEL382**	Theory of Structure-II	3	1	0	100
3.	**CEL383**	Estimation And Costing	2	1	0	100
4.	**CEL384**	Waste Water Engineering	2	1	0	100
5.	**CEL385**	Design of Concrete Structure-I	3	1	0	100
6.		Department Elective-III	3	0	0	100
Practical's						
1.	**CEP381**	Highways Engineering Laboratory	0	0	1	100
2.	**CEP384**	Environmental Engineering Laboratory	0	0	1	100
		Sub Total:	**15**	**5**	**2**	**900**
		Grand Total:	**22**			
Department Elective-III						
1.	**CEL386**	Ground Improvement Techniques	3	0	0	100
2.	**CEL387**	Pavement Design	3	0	0	100
3.	**CEL388**	Finite Elements Method	3	0	0	100

Semester-VII						
			Credits			
S. No.	**Subject Code**	**Subject**	**L**	**T**	**P**	**Marks**
1.	**CEL451**	Design of Concrete Structure-II	3	1	0	100
2.	**CEL452**	Design of Steel Structure-II	3	1	0	100
3.	**CEL453**	Water Resources Engineering-II	2	1	0	100
4.	**CEL454**	Foundation Engineering	2	1	0	100
5.		Department Elective-IV	3	0	0	100
6.		Department Elective-V	3	0	0	100
Practical's						
1.	**CEP451**	Departmental CAD Laboratory (RCC)	0	0	1	100
2.	**CEP452**	Departmental CAD Laboratory (Steel)	0	0	1	100
		Sub Total:	**16**	**5**	**2**	
		Grand Total:	**22**			**900**

Department Elective-IV						
1.	**CEL455**	Elements of Remote Sensing GIS	3	0	0	100
2.	**CEL456**	Engineering Geology Rock Mechanics	3	0	0	100
3.	**CEL458**	Town Planning	3	0	0	100

Department Elective-V						
1.	**CEL459**	Bridge Engineering	3	0	0	100
2.	**CEL460**	Elements of Earthquake Engineering	3	0	0	100
3.	**CEL461**	Pre- Stressed Concrete Design	3	0	0	100

Semester-VIII						
			Credits			
S. No.	**Subject Code**	**Subject**	**L**	**T**	**P**	**Marks**
1.	**CEP481**	Software Training*	0	0	5	125
2.	**CEP482**	Industrial Training	0	0	15	375
		Sub Total:	0	0	20	
		Grand Total:	**40**			**500**

*List of Software for Training to be learnt during Training Period Any software that enhances professional capability in civil engineering practice a partial indicative list is mentioned below:

1	PRIMA VERA
2	AUTOCAD CIVIL 3D
3	MX ROAD
4	STAAD PRO
5	GT STRUDAL
6	GEO STUDIO PROF 2004

CourseName	**:**	**Engineering Chemistry**
CourseCode	**:**	**CYL-197**
Credits (L-T-P)	**:**	**4 (3-0-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

CourseObjectives:

At the end of this course, the student should be able to understand the water quality requirement for human consumption, different treatment process for municipal water treatment, application of glass, ceramics, composites, magnetic materials, Role of refractories for synthesis of high performance materials. Polymer, rubber and silicone material uses in daily life. Introduction to electrochemistry. Application of CNT and graphene in electronics industry.

Total No. of Lectures –45

	Lecture wise breakup	**Numberof lectures**
	SECTION - A	
1	**Water hardness:** Common impurities of water, Hardness: Introduction, EDTA method for determination of hardness, degree of hardness. Numerical based on hardness and EDTA method.	4
2	**Water hardness related problems:** Boiler troubles, their causes, disadvantages and prevention: Formation of solids (scale and sludge), carry over (priming and foaming), corrosion and caustic embrittlement.	2
3	**Water treatment techniques**: Introduction, water purification techniques, steps involved in purification of water, sedimentation, coagulation, filtration and sterilization, chlorination.	3
4	**Softening of water:** Lime-Soda method, Zeolite method, Deionization/Demin-eralization methods. Numerical problems based on Lime-Soda and Zeolite softening methods.	3

SECTION - B		
5	**Glasses, Ceramics, Composites** Glassy state, glass formers and modifiers, types of glasses, manufacturing, applications. Ceramic structures, types of ceramics and their properties. Composites; types, properties and applications.	6
6	**Magnetic Materials:** Introduction, types of magnetic material, hard and soft ferrites, magnetic properties and applications.	3
7	**Refractories:** Definition, classification, properties, requisites of good refractory, manufacturing of refractory, silica and fire clay refractory and their uses. Seger's (Pyrometric) Cone Test and RUL Test.	3
SECTION - C		
8	**Polymers:** Introduction, classification and constituents of polymers, polymer structure and properties, glass transition temperature (T_g), melting point (T_m), structure-property relations (general), synthesis, properties and application of commercial polymers (Bakelite, Polyethylene, Polypropylene, Polystyrene, Polycarbonate, Polytetrafluoroethylene, Polyester and Nylon)	6
9	**Polymer processing methods**: Introduction, compounding, moulding (Injection, Compression, Blow film and Extrusion). Application of polymers such as contact lenses, bulletproof vest, etc.	3
10	**Rubber:** Introduction, natural rubber, vulcanization, different types of rubber, synthesis of rubbers viz. Buna-S, Buna-N, Buty1 and neoprene rubbers, properties and application.	3
SECTION - D		
12	**Silicone based compounds:** Introduction, properties, preparation of silicones, cross-linked silicones, silicon fluids or oils, silicon elastomers and their	2
13	**Electrochemistry:** Introduction, Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, Arrhenius theory of ionization, specific conductance, molar conductance, Faraday's Law of electrolysis, Chemical cells, distinguish between electrolytic and galvanic cell, reversible and irreversible cells with examples. Standard electrode (reduction) potential of half-cells. Applications of electrochemistry in daily life.	4
14	**Nanomaterial:** Introduction, properties, general methods of preparation. Applications of fullerenes, CNTs and graphene.	3

List of Practicals:

1. Determination of total hardness of Water.
2. Determination of temporary and permanent hardness of water.
3. To determine the strength of sodium carbonate in given sample of washing soda.
4. To determine the strength of sodium carbonate and sodium hydroxide in caustic soda solution.
5. To determine the strength of acetic acid in vinegar
6. Find the strength of KMnO4 solution with oxalic acid
7. Find the strength of KMnO4 solution with Mohr's salt.
8. To determine the number of water molecules in Mohr's salt by titration method.
9. Determination of relative viscosity of a given liquid with respect to water by viscometer.
10. Determination of surface tension of a given liquid by drop number method by stalagmometer.
11. To determine the strength of strong and weak acid conductometry
12. To determine the critical micelle concentration of a soap (sodium laurate) by surface tension measurements.

Course Outcomes:	
1	Develop new methods to produce soft water for industrial use and potable water at low cost.
2	Replace metals with polymer in different application areas.
3	Develop low cost and new methods for synthesis of Nano materials.
4	Apply their knowledge for development of new application of electrochemistry.
5	Demonstrate the knowledge of polymer materials for advance engineering applications.

Suggested / Reference Books:	
1	Engineering Chemistry by P.C. Jain & Monica Jain Dhanpat Rai Publishers, NewDelhi.2014.
2	Physical Chemistry by A. Peter and J.de. Paula 10th Edition Oxford University Press, 2014.
3	Inorganic Polymers by P.B. Saxena, Discovery Publishing House, 2007.
4	Ferrite materials by V.R.K. Murthy & B. Viswanathan, SpringerVerlag, Berlin, 1990
5	Advanced practical physical chemistry by J.B Yadav by Krishna's educational publishers.

E-learning resource: https://nptel.ac.in/courses.php

	:	**Mathematics-I**
Course Code	**:**	**MTL-101**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

The aim of the course is to introduce the different topics of calculus. The approximation of complex functions in term of power series, by using Taylor and Maclaurin's expansion is to be discussed. The power series approximation of functions makes its study simple as it is easy to do algebraic manipulation with series. The theory of convergence of infinite series will help in identifying whether the power series approximate the given function. The theory of vector calculus along with its applications in study of electric field and magnetic field etc. will be introduced.

Total No. of Lectures –

Lecture wise breakup		**Number of Lectures**
SECTION - A		
1	Infinite Series: Sequences and sub sequences and their convergence, Cauchy sequence, Infinite series and their convergence, Standard tests for convergence including p–test, Ratio test, Comparison test, Raabe's test, Cauchy Integral test, Cauchy root test, Gauss's test, Absolute convergence, Alternating series and its convergence, Power series.	
SECTION - B		
2	Calculus-I: Partial derivatives, Euler's theorem on homogeneous functions, Maclaurin's and Taylor's expansions of single and two variables, Maxima and minima of functions of several variables, Lagrangian method of multipliers.	
SECTION - C		
3	Calculus-II: Multiple integrals and their use in obtaining surface areas and volumes of solids.	
SECTION - D		
4	Vector Calculus: Scalar and Vector point functions, Differentiation of vectors, Gradient of a scalar field, Divergence and Curl of a vector field and their physical interpretations, Line integral of a vector field, Surface integral of a vector field, Volume integral of a scalar field, Green's theorem, Stokes theorem, Gauss divergence theorem (without proofs) and their applications.	

Course Outcomes:	
1	It will help in the study of complex mathematical functions by approximating them with power series expansions.
2	Electric field, magnetic field can be studied using vector calculus techniques.
3	It will equipped the students in determining whether the given function can be approximated with the power series.

Suggested / Reference Books:	
1	Louis A. Pipes: Applied Mathematics for Engineers and Physicists, McGraw Hill Book Company.
2	Kreyszig: Engineering Mathematics, Wiley Eastern Ltd.
3	B.S. Grewal: Higher Engineering Mathematics, Khanna Publisher, New Delhi.

Course Name	**:**	**Basic Electrical & Electronics Engineering**
Course Code	**:**	**ECL-119**
Credits (L-T-P)	**:**	**5 (4-0-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

This course is aimed to introduce important initial understanding of electrical and electronics engineering to the 1st year students, this will act as the foundation for the advanced electronics courses. The aim of this course is to familiarize the students to the basics of electricity, electrical machines and the basics of electronic devices. so that they can use this knowledge in relevant applications.

Total No. of Lectures –48

	Lecture wise breakup	**Number of Lectures**
	SECTION – A	
1	**Electricity and power supply**: Features of the power supply system, power station, transmission, distribution lines, difference between AC and DC, voltage, current and resistance, concept of electromagnetic induction and production of alternating e.m.f - single phase and 3 phase, 3-phase star and delta connections, voltage and current relations. **Electrical Machinery:** Transformer, its working principle, types of transformers and their applications, performance losses, efficiency and voltage regulation, open circuit and short circuit tests on transformer, auto transformers.	12
	SECTION – B	
2	**Circuit Analysis**: A brief review of DC and single phase AC circuits. , Star-delta load transformation, concept of balanced and unbalanced three phase circuits, measurement of power and power factor in three phase balanced circuits. **Semiconductors:** Introduction to semiconductors, Intrinsic Semiconductor, n-type and p-type semiconductors, Effect of Doping, Fermi levels, Charge flow in semiconductors.	12

SECTION – C		
3	**PN junction diode**: Theory of PN junction diode, depletion layer, barrier potential, Volt-Ampere Characteristics, Current Components, Storage Capacitance and transition capacitance, Junction diode switching times, Zener diode, LED, Photodiode, Varactor diode, Schottky diode **Bipolar Junction Transistors**: Junction Transistor, Current components, transistor as an amplifier, CB, CE and CC configurations and characteristics.	12
SECTION – D		
4	**Fundamentals of DC & AC Motors:** Working principle, construction, types & characteristics of DC motor, Working principle of Single-Phase & Three-Phase Induction motor, Three phase synchronous motor. **Control and Protection**: Control mechanism, principle and applications of protection devices: Fuses, MCB, LCB, relays. Need& types of earthing and grounding, Cables, Construction of LT & HT cables.	12

Course Outcomes: After study of this subject the student will become	
1	Familiar with the electricity production, distribution and the use of control/protection devices.
2	Able to understand the working and applications of electrical machines.
3	Able to understand the basics of semiconductor devices and their applications.
4	Familiar to the concept of rectification and filtration circuits.
5	Able to analyze the basic DC and AC circuits and to solve related circuit problems.

Suggested / Reference Books:	
1	Principles of Electrical Engineering by Gupta BR; S. Chand and Company, New Delhi.
2	Electrical Technology by Hughes Edward; The English Language Book Society and Longmans. Group Limited, London
3	Electrical Machines by Bhattacharya SK; Tata McGraw Hill, Delhi.
4	Basic Electrical Engineering by T.K. Naggarkar& Ms. Sakhija Seventh Edition 2008, Oxford University Press.
5	Electronic Devices and Circuit Theory, Boylestad R.L. VIII Edition, Pearson Education, 2008.
6	Electronic Fundamentals & Application, J.D. Ryder, PHI, 2006.
7	Experiments in Electrical Engineering by Bhatnagar US; Asia Publishing House, Bombay.

PRACTICAL:

1. Study of VI characteristics of PN junction
2. Study of Half wave, full wave & Bridge rectifiers.
3. Study of simple capacitive, T & II filters.
4. Study of zener as a voltage regulator.
5. Study of transistor characteristics in CC, CB and CE configuration
6. To study the performance characteristic of clipper circuit
7. To study the performance characteristic of clamper circuit

Course Name	**:**	**Fundamentals of information technology and programming using python**
Course Code	**:**	**CSL 126**
Credits (L-T-P)	**:**	**4 (2-1-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

At the end of this course, the student should be able to understand the basics of computer as well as programming. The students are able to write programs. This course introduces computer programming using the Python programming language. Emphasis is placed on common algorithms and programming principles utilizing the standard library with Python.

Total No. of Lectures – 48

	Lecture wise breakup	Number of Lectures
	SECTION - A	
1	Block diagram of Computer, Associated peripherals, Memories – RAM, ROM, Secondary Storage Devices, Classification of Computers and Languages, Introduction to Compilers, Interpreter and Assemblers, Introduction of various operating system with their file system.	12
	SECTION - B	
2	Algorithm and Flowchart, Introduction to Python and Setting up the Python development environment, Basic syntax, interactive shell, editing, saving, and running a script, Concept of data types, Random number, Real numbers, immutable variables, Python console Input / Output. Arithmetic operators and expressions, Conditions, Comparison operators, Logical Operators, Is and In operators, Control statements: if-else, Nested If-Else, Loops (for, while)	12
	SECTION - C	
3	Built in function and modules in python, user defined functions, passing parameters, arguments and return values; formal vs actual arguments, Recursion, lists, Common List operations	12

SECTION - D		
4	String Handling, Unicode strings, Strings Manipulation:-compare strings, concatenation of strings, Slicing strings in python, converting strings to numbers and vice versa. Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).	12

Course Outcomes:	
1	Implement a given algorithm as a computer program in python language with the understanding of hardware components and memory utilization.
2	Able to use standard programming constructs: repetition, selection, functions, composition, modules and different data types
3	Adapt and combine standard algorithms to solve a given problem (includes numerical as well as non-numerical algorithms) and to debug the program written in python language

Suggested / Reference Books:	
1	Computers Today by Sanders.
2	Fundamentals of Computers TTTI Publication.
3	Learning Python by Mark Lutz, 5th edition
4	Python cookbook, by David Beazley , 3rd Edition
5	Python Essential Reference, by David Beazley , 4th edition
6	Python in a Nutshell, by Alex Mortelli, 2nd Edition.
7	Python programming: An Introduction to computer science, by John Zelle, 2nd Edition.

ENL-101: COMMUNICATIVE ENGLISH –I
(Ability Enhancement Compulsory Course)

Credits: 02 (L=2,T=0,U=0)
Total Marks-50
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Objective: To introduce students to the skills and strategies of reading and writing by identifying organizational patterns, spotting classification systems and understanding associations between ideas. This course will prepare students to read a variety of texts and also to communicate more effectively through writing. The course will also pay special attention to vocabulary building.

Prescribed Text books:

- *The Written Word* by Vandana R. Singh, Oxford University Press, New Delhi.
- *Making Connections: A Strategic Approach to Academic Reading* by Kenneth J. Pakenham, Second Edition.

SECTION–A
"Word List", "Correct Usage of Commonly used words and Phrases" from the chapter "Vocabulary" given in ***The Written Word*** by Vandana R. Singh.

SECTION–B
Letter- writing as prescribed in ***The Written Word*** by Vandana R. Singh.
Report writing as prescribed in ***The Written Word*** by Vandana R. Singh.

SECTION–C
Section 1 from ***Making Connections: A Strategic Approach to Academic Reading*** by Kenneth J. Pakenham, Second Edition.

SECTION–D
Section 2 from ***Making Connections: A Strategic Approach to Academic Reading*** by Kenneth J. Pakenham, Second Edition.

CourseName	**:**	**Workshop Practices**
CourseCode	**:**	**MEP-101**
Credits (L-T-P)	**:**	**2 (0-0-2)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Course Objectives:

At the end of this course, the student should be able to understand the

1. Understand applications of hand tools and power tools.
2. Understand the operations of machine tools.
3. Select the appropriate tools required for specific operation.
4. Comprehend the safety measures required to be taken while using the tools.

Total No. of Practicals – 48

	Lecture wise breakup	**Number of Practicals**
	SECTION - A	
1	Carpentry Shop: (a) Study of tools & operations and carpentry joints. (b) Simple exercise using jackplane. (c) To prepare half-lap corner joint, mortise &tennon joints. (d) Simple exercise on wood working lathe.	6
2	Fitting (Bench Working) Shop: (a) Study of tools & operations (b) Simple exercises involving fitting work. (c) Make perfect male-female joint. (d) Simple exercises involving drilling / tapping / dieing.	6
	SECTION - B	
3	Black Smithy Shop: (a) Study of tools & operations (b) Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering& swaging.	6
4	Welding Shop: (a) Study of tools & operations of Gas welding & Arc welding. (b) Simple butt and Lap welded joints. (c) Oxy-acetylene flame cutting.	6

SECTION - C		
5	Sheet-metal Shop: (a) Study of tools & operations. (b) Making Funnel complete with soldering. (c) Fabrication of tool-box, tray, electric panel box etc.	6
6	Machine Shop: (a) Study of Single point cutting tool, machine tools and operations. (b) Plane turning. (c) Step turning. (d) Taper turning. (e) Threading.	6
SECTION - D		
7	Foundry Shop: (a) Study of tools & operations (b) Pattern making. (c) Mould making with the use of a core. (d) Casting	6
8	Electrical and Electronics Shop: (a) Study of tools & operations	6

Course Outcomes:	
1	To acquire skills in basic engineering practice, measuring skills and practical skills in the trades.
2	To provides the knowledge of job materials in various shops.
3	To identify the hand tools and instruments.
4	To provides the knowledge of core technical subjects for making and working ofany type of project.
5	Understand modern manufacturing operations, including their capabilities,limitations, and how to design economically.
6	Gain insight into how designers influence manufacturing schedule and cost, andcost of different components.
7	Learn how to analyze products and be able to improve their manufacturability andmake the cost effectively.

Suggested / Reference Books:	
1	Lab Manual to be provided by Department of Mechanical Engineering
2	Work shop technology by Hajra and Chaudhary
3	Work shop technology by Chapmen

PBL 121 : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ - I

ਸਮਾਂ : 3 ਘੰਟੇ ਕਰੈਡਿਟ : 2
ਕੁਲ ਅੰਕ : 50

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ-ਏ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ) ਕਵਿਤਾ ਭਾਗ : 1-4 ਕਵੀ
(ਕਵੀ ਦਾ ਜੀਵਨ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਕਾਵਿ-ਕਲਾ)

II. ਗੁਰਮੁਖੀ ਔਰਥੋਗਰਾਫੀ ਦੀ ਜੁਗਤ (ਪੈਂਤੀ, ਮੁਹਾਰਨੀ, ਬਿੰਦੀ, ਟਿੱਪੀ ਤੇ ਅੱਧਕ); ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹ, ਸ਼ਬਦ ਜੋੜ (ਸ਼ੁਧ-ਅਸ਼ੁਧ)

ਸੈਕਸ਼ਨ-ਬੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਕਵਿਤਾ ਭਾਗ : 5-8 ਕਵੀ
(ਕਵੀ ਦਾ ਜੀਵਨ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਕਾਵਿ-ਕਲਾ)

II. ਲੇਖ ਰਚਨਾ (ਜੀਵਨੀ-ਪਰਕ, ਸਮਾਜਕ ਅਤੇ ਚਲੰਤ ਵਿਸ਼ਿਆਂ ਉੱਤੇ) : 10 ਲੇਖ ਲਿਖਵਾਉਣੇ
(ਕਲਾਸ ਵਿਚ ਅਤੇ ਘਰ ਲਈ ਅਭਿਆਸ)

ਸੈਕਸ਼ਨ-ਸੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਕਹਾਣੀ ਭਾਗ : 1-4 ਕਹਾਣੀਆਂ
(ਕਹਾਣੀ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ, ਸਾਰ, ਕਹਾਣੀ-ਕਲਾ)

II. ਸ਼ੁੱਧ, ਅਸ਼ੁੱਧ : ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨਾ
(15 ਪੈਰ੍ਹਿਆਂ ਦੇ ਸ਼ੁੱਧ ਅਸ਼ੁੱਧ ਅਭਿਆਸ ਕਰਵਾਉਣੇ)

ਸੈਕਸ਼ਨ-ਡੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਕਹਾਣੀ ਭਾਗ : 5-8 ਕਹਾਣੀਆਂ
(ਕਹਾਣੀ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ, ਸਾਰ, ਕਹਾਣੀ-ਕਲਾ)

II. ਅਖ਼ਬਾਰੀ ਇਸ਼ਤਿਹਾਰ : ਨਿੱਜੀ, ਦਫ਼ਤਰੀ ਤੇ ਸਮਾਜਕ ਗਤੀਵਿਧੀਆਂ ਨਾਲ ਸੰਬੰਧਤ

ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਰਾਜਿੰਦਰਪਾਲ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਕਵਿਤਾ ਦਾ ਇਤਿਹਾਸ**, ਪੰਜਾਬੀ ਅਕਾਦਮੀ, ਦਿੱਲੀ।
2. ਬ੍ਰਹਮਜਗਦੀਸ਼ ਸਿੰਘ, **ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਾਵਿ ਸਿਧਾਂਤ, ਇਤਿਹਾਸ ਅਤੇ ਪ੍ਰਵਿਰਤੀਆਂ**, ਵਾਰਿਸ ਸ਼ਾਹ ਫਾਉਂਡੇਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
3. ਬਲਦੇਵ ਸਿੰਘ ਧਾਲੀਵਾਲ, **ਪੰਜਾਬੀ ਕਹਾਣੀ ਦਾ ਇਤਿਹਾਸ**, ਪੰਜਾਬੀ ਅਕਾਦਮੀ, ਦਿੱਲੀ।
4. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, **ਪੰਜਾਬੀ ਕਹਾਣੀ ਦਾ ਸਫ਼ਰ ਤੇ ਸ਼ਾਸਤ੍ਰ ਭਾਗ-**, ਸਿੰਘ ਬ੍ਰਦਰਜ਼, ਅੰਮ੍ਰਿਤਸਰ।
5. ਹਰਕੀਰਤ ਸਿੰਘ ਤੇ ਗਿਆਨੀ ਲਾਲ ਸਿੰਘ, **ਕਾਲਜ ਪੰਜਾਬੀ ਵਿਆਕਰਣ**, ਪੰਜਾਬ ਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ੍ਹ।
6. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।
7. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ
8. **ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਬੋਧ**, ਕਸਤੂਰੀ ਲਾਲ ਐਂਡ ਸੰਨਜ਼, ਅੰਮ੍ਰਿਤਸਰ।

PBL-122 : ਮੁੱਢਲੀ ਪੰਜਾਬੀ
(In lieu of Compulsory Punjabi)

ਸਮਾਂ : 3 ਘੰਟੇ ਕਰੈਡਿਟ : 2

ਕੁਲ ਅੰਕ : 50

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ–ਏ

ਪੈਂਤੀ ਅੱਖਰੀ : ਅੱਖਰ ਕ੍ਰਮ, ਮਾਤ੍ਰਾਵਾਂ
(ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ)
ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) : ਪਛਾਣ ਤੇ ਵਰਤੋਂ

ਸੈਕਸ਼ਨ–ਬੀ

ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ : ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ
ਸਾਧਾਰਨ ਸ਼ਬਦ, ਸੰਯੁਕਤ ਸ਼ਬਦ, ਮਿਸ਼ਰਤ ਸ਼ਬਦ
ਮੂਲ ਸ਼ਬਦ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ

ਸੈਕਸ਼ਨ–ਸੀ

ਸ਼ੁੱਧ ਅਸ਼ੁੱਧ : ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨਾ
ਸਮਾਨਾਰਥਕ ਤੇ ਵਿਰੋਧਾਰਥਕ ਸ਼ਬਦ

ਸੈਕਸ਼ਨ–ਡੀ

ਹਫ਼ਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ,
ਇਕ ਤੋਂ ਸੌ ਤੱਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿਚ

ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਅਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।
2. **ਮੁੱਢਲੀ ਪੰਜਾਬੀ**, ਕਸਤੂਰੀ ਲਾਲ ਐਂਡ ਸੰਨਜ਼, ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
3. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

PUNJAB HISTORY & CULTURE

HSL-101 : HISTORY AND CULTURE OF THE PUNJAB (1450-1716)
(Special paper in lieu of Punjabi Compulsory)

Credits: 2-0-0
Mid Semester: 20 Marks
End Semester: 80 Marks
Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

1. Land and the People.
2. Bhakti Movement

SECTION-B

3. Life and Teaching of Guru Nanak Dev.
4. Contribution of Guru Angad Dev, Guru Arjun Dev ,Guru Amar Das and Guru Ram Das.

SECTION-C

5. Guru Hargobind.
6. Martyrdom of Guru Teg Bahadur

SECTION-D

7. Guru Gobind Singh and the Khalsa.
8. Banda Singh Bahadur: Conquests and Execution.

Suggested Reading

1. Kirpal Singh(ed.), *History and Culture of the Punjab, Part-ii, Punjabi University,* Patiala. 1990.
2. Fauja Singh (ed.), *History of Punjab, Vol, III Punjabi University, Patiala, 1987.*
3. J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991.*
4. Khushwant Singh, *A History of the Sikhs*, Vol. I, OUP, New Delhi, 1990

Course Name	**:**	**Engineering Mechanics**
Course Code	**:**	**CEL-120**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

- To understand distributed force systems, centroid/ centre of gravity and method of finding centroids of composite figures and bodies.
- To understand moment of inertia and method of finding moment of inertia of areas and bodies.
- To understand dynamics of a particle.
- To understand the kinetics of rigid bodies and simple problems.

Total No. of Lectures –

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	Introduction: Force system, dimensions and units in mechanics, laws of mechanics,vectoralgebra, addition and subtraction of forces, cross and dot products of vectors, moment of aforceabout a point and axis, couple and couple moment, transfer of a force to a parallel position, resultant of a force system using vector method, Problems involving vector application. Equilibrium: Static and dynamic equilibrium, static in determinacy, general equations of equilibrium, Varingnon's theorem, Lami's theorem, equilibrium of bodies under a force system, Problems.	
	SECTION - B	
2	Truss and Frames: Truss, classification of truss, assumptions in truss analysis, perfect truss, analysis of perfect plane truss using method of joints and method of sections, Problems. Centroid, Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Problems.	
	SECTION - C	
3	Moment of Inertia: Area moment of inertia, mass moment of inertia, parallel axis and perpendicular axis theorems, radius of gyration, polar moment of inertia, product of inertia, principle axis, problem based on composite figures and solid objects. Kinematics: Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problems.	

SECTION - D		
4	Particle Dynamics: Energy methods and momentum methods, Newton's laws, work energy equation for a system of particles, linear and angular momentum equations, projectile motion, problem. Shear Force and Bending Moment Diagram for statically determinant beams Classification of beams, types of loads, shear force and bending moment calculation and their graphical	

Course Outcomes:	
1	Basic understanding of laws and principles of mechanics.
2	Ability to analyse and solve simple problems of mechanics.
3	An understanding of assumptions and limitations of approaches used.

Suggested / Reference Books:	
1	Engineering Mechanics – Irving H. Shames, PHI Publication.
2	Engineering Mechanics – U.C.Jindal, Galgotia Publication.
3	Mechanics–Berkeley Physics Course, Vol–I (Second Edition): C. Kittel, W.D. Knight, M.A. Ruderman, C.A. Helmholtz and R.J. Moyer–Tata McGraw Hill Publishing Company Ltd., New Delhi.

MEL120: ENGINEERING GRAPHICS & DRAFTING

L T P

2 0 2

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

A. Increase ability to communicate with people
B. Learn to sketch and take field dimensions.
C. Learn to take data and transform it into graphic drawings.
D. Learn basic engineering drawing formats
E. Prepare the student for future Engineering positions

Course Outcomes:

1. Student's ability to hand letter will improve.
2. Student's ability to perform basic sketching techniques will improve.
3. Students will be able to draw ortho graphic projections and sections.
4. Student's ability to use architectural and engineering scales will increase.
5. Students ability to produce engineered drawings will improve
6. Student's ability to convert sketches to engineered drawings will increase.
7. Students will become familiar with office practice and standards.
8. Students will develop good communication skills and teamwork.

SECTION A

Drawing Techniques: Various types of lines, principles of dimensioning, size and location of dimensions, symbols, conventions scales (plane and diagonal) and lettering as per ISCodeSP-46 of practice for general engineering drawings. Practice of drawing various types of lines and dimensioning exercises. Drawing exercises pertaining to symbols, conventions. Exercise on lettering techniques: Freehand printing letters and numeral sin 3, 5, 8 and 12 mm sizes vertical and inclined; instrumental lettering in single stroke.

Projection of Points, Lines and Planes : First, second, third and fourth angle projections, concept of horizontal and vertical planes, Projection of point sand lines, True length, Horizontal and vertical traces, Projection of Planes, Traces of Planes, Auxiliary planes. Practice exercises on projection of points, lines and planes.

SECTION B

Projection and Section of Solids: Projection of solids such as Prisms, Pyramids, Cylinders, Cones, Spheres, Auxiliary View. Principles of sectioning, types of sectioning, section lines, cutting plane lines. Practice on projection of solids and section of solids.

SECTION C

Intersection and Development of Surfaces: Inter section of cylinders, cones, prisms, and pyramids, Axis of solids being vertical or horizontal. Development of surfaces of truncated cylinders, cones, pyramids and prisms. Exercises on intersection of solids– cylinder and cylinder, cylinder and cone, prism and prism, prism and cone, sphere with cylinder. Exercises involving development of surfaces (Y–Piece, Hopper, Tray and truncated pieces).

SECTION D

Isometric Projection: Exercises on is ometric views.

Orthographic Projections: Orthographic views, Missing views. Exercises on identification of missing views. Practice on ortho graphic projections.

Practice of free hand sketching of different types of objects.

Fasteners: Introduction to temporary and permanent fasteners riveted and welded joints, types screw threads, conventional symbols for internal and external threads. Exercises involving drawing of bolts, nuts, studs and locking devices.

Symbols and Conventions: Symbol and conventions pertaining to relevant engineering disciplines.

Books Recommended:

1. Engineering Drawing by PS Gill, S K Kataria and Sons, Ludhiana.

2. Engineering Drawing by NK Bhatt.

3. Text Book of Engineering Drawing by R.K. Dhawan, S.Chand & Company Ltd.

4. Engineering and Teaching Drawing by Earl D.Black.

Course Name	**:**	**Mathematics-II**
Course Code	**:**	**MTL-102**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

The goal of the course is to introduce the theory of differential equations along with their applications in modeling the engineering system. The course also introduces complex analysis and its uses to study Fourier transform and series. The students will also be apprised with Laplace and Fourier transforms as a toll for analysis/ processing of signals and solution of differential and integral equations.

Total No. of Lectures –

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	Differential Equations: Exact differential Equation, Higher order linear Differential equations, ODE's with constant coefficients.	
	SECTION - B	
2	Laplace Transforms: Laplace transforms, Properties of Laplace transforms, Laplace transform of derivatives and differentiation theorem, Integration theorem, Laplace transform of Integrals, Inverse Laplace transform, Formulas for obtaining inverse Laplace transforms, Convolution theorem, The second shifting property.	
	SECTION - C	
3	Fourier Series and Fourier Transform: Fourier series expansion, Fourier series for even and odd functions, half range series, harmonic functions, Modulation theorem, Shifting properties, convolution theorems, sine and cosine transforms, Fourier transform of derivatives and integrals, inverse Fourier transform, applications to PDE's & ODE's .	

SECTION - D		
4	Complex Analysis: De Moivre's theorem with applications, Analytic functions, Cauchy – Riemann equations, Laplace equation, Cauchy's integral theorem, Cauchy's integral formula (without proofs), Taylor series and Laurent series(without proofs), Residues and their application in evaluating real improper integrals	

Course Outcomes:	
1	It will help the students in the study of engineering system by modeling it with ordinary and partial differential equations.
2	With Laplace transform, mathematical models involving differential equations can be simplified and studied by solving algebraic equations.
3	In engineering, sound, signal, etc can be represented by mathematical functions, Fourier transforms/ series enable the engineers in simplications of the study of these functions.

Suggested / Reference Books:	
1	Louis A. Pipes: Applied Mathematics for Engineers and Physicists, McGraw Hill Book Company.
2	Kreyszig: Engineering Mathematics, Wiley Eastern Ltd.
3	B.S. Grewal: Higher Engineering Mathematics, Khanna Publisher, New Delhi.

Course Name	**:**	**Physics**
Course Code	**:**	**PHL-183**
Credits (L-T-P)	**:**	**5 (3-1-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

- To make the students aware about Electromagnetic wave fundamentals.
- To make students aware about quantum physics phenomena.

Total No. of Lectures – 48

	Lecture wise breakup	Number of Lectures
	SECTION – A	
1	Electric and magnetic fields in a medium, Susceptibility and Conductivity, Maxwell's equations, Boundary conditions; EM wave equation, Plane wave solutions.	12
	SECTION – B	
2	Polarization of the EM waves, Pointing vector and intensity of the EM wave; Wave packet, Phase and Group velocities; Reflection and refraction of EM waves at a dielectric interface; Brewster angle; Total internal reflection at a dielectric interface; EM waves in a conducting medium and plasma.	12
	SECTION – C	
3	Wave-particle duality, de-Broglie waves; Quantum mechanical operators; Schroedinger equation, Wave function, Statistical interpretation, Superposition Principle, Continuity equation for probability density; Stationary states, Bound states.	12
	SECTION - D	
4	Free-particle solution, 1-D infinite potential well, Expectation values and uncertainty relations; 1-D finite potential well, Quantum mechanical tunneling and alpha- decay, Kronig-Penny model and emergence of bands	12

Course Outcomes:	
1	This will enable the students to learn physical concepts associated with electromagnetic radiation and devices.
2	Student will understand quantum mechanical aspects of physics.

Suggested / Reference Books:	
1	Concepts of Modern Physics. Arthur Beiser, (Tata McGraw-Hill, Sixth Edition 2003).
2	Lasers & Nonlinear optics. B.B. Laud (New Delhi, India: Wiley Eastern 1991).

Course Name	**:**	**Introduction to Engineering Materials**
Course Code	**:**	**MEL-110**
Credits (L-T-P)	**:**	**3 (3-0-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

At the end of this course, the student should be able to understand the:

1. To review physics and chemistry in the context of materials science & engineering.
2. To describe the different types of bonding in solids, and the physical outcomes of these differences.
3. Give an introduction to metals, ceramics, polymers, and electronic materials in the context of a molecular level understanding of bonding.
4. Give an introduction to the relation between processing, structure, and physical properties.
5. Give the beginning student an appreciation of recent developments in materials science & engineering within the framework of this class.
6. Give the beginning student practice in basic expository technical writing.

Total No. of Lectures – 47

	Lecture wise breakup	Number of Lectures
	SECTION - A	
1	Introduction**:** Historical perspective, scope of materials science and engineering. Atomic structure and interatomic bonding. Lattices, basic idea of symmetry.	11
	SECTION - B	
2	Lattice structure: Bravais lattices, unit cells, crystal structures, crystal planes and directions, co-ordination number. Single crystals, polycrystalline, non-crystal line, nano-crystalline materials. Imperfections in solids: point defects, line defects, surface defects.	12
	SECTION - C	
3	Solid solutions: phases, phase diagrams. Diffusion phenomenon, phase transformations. Strengthening mechanisms.	12

SECTION - D		
4	Classification of materials: properties of materials. Structure, properties and applications of different metals and alloys, ceramics, composites and polymers.	12

Course Outcomes:	
1	Given a type of material, be able to qualitatively describe the bonding scheme and its general physical properties, as well as possible applications.
2	Given a type of bond, be able to describe its physical origin, as well as strength.
3	Be able to qualitatively derive a material's Young's modulus from a potential energy curve.
4	Given the structure of a metal, be able to describe resultant elastic properties in terms of its 1D and 2D defects.
5	Be able to do simple diffusion problems.

Suggested / Reference Books:	
1	Materials Science and Engineering by W.D.Callister Jr.(John Wiley & Sons Inc., Eighth Edition).
2	Materials Science and Engineering: A First Course by V.Raghvan (Prentice-Hall of India Pvt. Ltd.).

PBL 131 : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ–II
(Ability Enhancement Compulsory Course)

ਸਮਾਂ : 3 ਘੰਟੇ **ਕਰੈਡਿਟ : 2**

ਕੁਲ ਅੰਕ : 50

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ–ਏ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
1–4 ਨਿਬੰਧ
(ਨਿਬੰਧ ਦਾ ਸਾਰ, ਵਾਰਤਕ ਕਲਾ ਅਤੇ ਸ਼ੈਲੀ)

II. ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ : ਧਾਤੂ/ਮੂਲ, ਵਧੇਤਰ (ਅਗੇਤਰ, ਪਿਛੇਤਰ, ਵਿਉਂਤਪਤ ਅਤੇ ਰੁਪਾਂਤਰੀ), ਸਮਾਸ।

ਸੈਕਸ਼ਨ–ਬੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
5–8 ਨਿਬੰਧ
(ਨਿਬੰਧ ਦਾ ਸਾਰ, ਵਾਰਤਕ ਕਲਾ ਅਤੇ ਸ਼ੈਲੀ)

II. ਪੈਰ੍ਹਾ ਰਚਨਾ : ਕਲਾਸ ਵਿਚ 10 ਵਿਸ਼ਿਆਂ (ਸਭਿਆਚਾਰ, ਧਾਰਮਕ ਅਤੇ ਰਾਜਨੀਤਕ) 'ਤੇ ਪੈਰ੍ਹਾ ਰਚਨਾ ਦੇ ਅਭਿਆਸ ਕਰਵਾਉਣੇ।

ਸੈਕਸ਼ਨ–ਸੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
1–4 ਰੇਖਾ ਚਿਤਰ
(ਨਾਇਕ ਬਿੰਬ, ਕਲਾਤਮਕ ਪੱਖ)

II. ਮੁਹਾਵਰੇ ਤੇ ਅਖਾਣ (ਅਖਾਣ ਤੇ ਮੁਹਾਵਰਾ ਕੋਸ਼ ਵਿਚ) 200 ਮੁਹਾਵਰਿਆਂ ਅਤੇ 100 ਅਖਾਣਾਂ ਨੂੰ ਵਾਕਾਂ ਵਿਚ ਵਰਤਣ ਦੇ ਅਭਿਆਸ ਕਰਵਾਉਣੇ (ਕਲਾਸ ਵਿਚ ਤੇ ਘਰ ਲਈ)।

ਸੈਕਸ਼ਨ–ਡੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
5–8 ਰੇਖਾ ਚਿਤਰ
(ਨਾਇਕ ਬਿੰਬ, ਕਲਾਤਮਕ ਪੱਖ)

II. ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ, ਸੰਬੰਧਕ

ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਸਤਿੰਦਰ ਸਿੰਘ, **ਪੰਜਾਬੀ ਵਾਰਤਕ ਦਾ ਇਤਿਹਾਸ**, ਪੰਜਾਬੀ ਅਕਾਦਮੀ, ਦਿੱਲੀ।
2. ਪ੍ਰੋ. ਪਿਆਰਾ ਸਿੰਘ, **ਪੰਜਾਬੀ ਵਾਰਤਕ : ਸਿਧਾਂਤ ਇਤਿਹਾਸ ਪ੍ਰਵਿਰਤੀਆਂ**, ਨਿਊ ਬੁੱਕ ਕੰਪਨੀ, ਜਲੰਧਰ।
3. ਇੰਦਰਪ੍ਰੀਤ ਸਿੰਘ ਧਾਮੀ, **ਪੰਜਾਬੀ ਰੇਖਾ ਚਿਤਰ : ਰੂਪ ਤੇ ਪ੍ਰਕਾਰਜ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
4. ਬਲਬੀਰ ਸਿੰਘ ਦਿਲ, **ਪੰਜਾਬੀ ਨਿਬੰਧ : ਸਰੂਪ, ਸਿੱਧਾਂਤ ਅਤੇ ਵਿਕਾਸ**, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।
5. ਹਰਕੀਰਤ ਸਿੰਘ ਤੇ ਗਿਆਨੀ ਲਾਲ ਸਿੰਘ, **ਕਾਲਜ ਪੰਜਾਬੀ ਵਿਆਕਰਣ**, ਪੰਜਾਬ ਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ੍ਹ।
6. ਡਾ. ਅਮਰ ਕੋਮਲ (ਸੰਪਾ.), **ਚੋਣਵੇਂ ਪੰਜਾਬੀ ਨਿਬੰਧ** (ਭੂਮਿਕਾ), ਨੈਸ਼ਨਲ ਬੁੱਕ ਟਰੱਸਟ, ਇੰਡੀਆ।
7. ਅਬਨਾਸ਼ ਕੌਰ, **ਪੰਜਾਬੀ ਰੇਖਾ ਚਿੱਤਰ**, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।
8. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
9. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।

PBL-132 : ਮੁੱਢਲੀ ਪੰਜਾਬੀ
(In lieu of Compulsory Punjabi)

ਸਮਾਂ : 3 ਘੰਟੇ ਕਰੈਡਿਟ : 2

ਕੁਲ ਅੰਕ : 50

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ-ਏ

ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ
(ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ)

ਸੈਕਸ਼ਨ-ਬੀ

ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ : ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਰਿਸ਼ਤੇ-ਨਾਤੇ, ਖੇਤੀ ਅਤੇ ਹੋਰ ਧੰਦਿਆਂ ਨਾਲ ਸੰਬੰਧਤ

ਸੈਕਸ਼ਨ-ਸੀ

ਪੰਜਾਬੀ ਵਾਕ-ਬਣਤਰ
ਸਾਧਾਰਨ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)
ਸੰਯੁਕਤ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)
ਮਿਸ਼ਰਤ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

ਸੈਕਸ਼ਨ-ਡੀ

ਪੈਰ੍ਹਾ ਰਚਨਾ
ਸੰਖੇਪ ਰਚਨਾ

ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਅਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।
2. **ਮੁੱਢਲੀ ਪੰਜਾਬੀ**, ਕਸਤੂਰੀ ਲਾਲ ਐਂਡ ਸੰਨਜ਼, ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
3. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

HSL-102 : HISTORY AND CULTURE OF THE PUNJAB (1717-1947)
(Special paper in lieu of Punjabi Compulsory)

Credits: 2-0-0
Marks : 50
Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

1. Sikh Struggle for Sovereignty.
2. Ranjit Singh : Conquests, Administration and the Anglo-Sikh Relations.

SECTION-B

3. Anglo-Sikh Wars and the Annexation.
4. The Punjab under the British: New Administration, Education and social Change.

SECTION-C

5. Economic Changes: Agricultural
6. Socio-Religious Reform Movements.

SECTION-D

7. Role of Punjab in the Freedom Struggle.
8. Fairs and Festivals.

Suggested Reading

1. Kirpal Singh (ed.), *History and Culture of the Punjab,* Part-II, Punjabi University, Patiala, 1990.
2. Fauja Singh (ed.), *History of Punjab,* Vol, III, Punjabi University, Patiala, 1987.
3. J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991.*
4. Khushwant Singh, *A History of the Sikhs,* Vol. I, OUP, New Delhi, 1990

CEL251: CIVIL ENGINEERING MATERIALS

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Building Stones Bricks: General, characteristics of a good building stone, deterioration preservation of stones, artificial stones, composition of good brick earth, qualities of good bricks, classification of bricks, tests on bricks, varieties of fire bricks.

Cement: Composition of cement, raw materials, manufacturing process, varieties of cement, hydration of cement, properties, testing of cement.

Concrete: Introduction, constituents of concrete, batching of materials, manufacturing process of cement concrete, workability factors affecting it, methods to determine workability, segregation bleeding of concrete, strength of concrete factors affecting it.

Section B

Timber: Structure of a tree, classification of trees, defects in timber, qualities of good a timber, seasoning of timber, decay of timber, preservation of timber.

Miscellaneous Materials: Paints, distempering, glass, plastics.

Foundation Walls: Definition, types of foundations, causes of failures of foundation remedial measures, types of walls thickness considerations.

Brick Stone Masonry: Terms used, types of bonds their merits demerits, rubble ashlar joints in stone masonry, cement concrete hollow blocks their advantages disadvantage.

Section C

Damp Proofing: Sources, causes bad effects of dampness, preventive measures for dampness in buildings.

Roofs: Terms used, classification of roofs roof trusses, different roof covering materials**.**

Plastering Pointing: Objects, methods of plastering, materials types, defects in plastering, special material for plastered surface, distempering white washing colour washing**.**

Floors: General, types of floors used in building their suitability, factors for selecting suitable floor for building**.**

Section D

Miscellaneous Topics: Building services – plumbing service, electrical services, air conditioning, accoustics sound insulation, fire protection measures, lift.

Recycling of Materials: Uses benefits of recycling of materials such as Fly ash, Lime stone powder, Metakaolin, Silica fume, Blast furnace slag etc. in concrete. Introduction to use of recycled aggregates in concrete.

References:

1. Rangwala, S. C., “Engineering Materials” Charotar Publishing House, (*2000*).
2. Ghose, D. N., “Materials of Construction” Tata McGraw Hill, New Delhi, (*2003*).
3. Varghese, “Building Materials” Prentice Hall of India, New Delhi, (*2005*).
4. Neville, A. M., “Properties of Concrete” Pearson Publishers, New Delhi, (*2004*).
5. Singh, S., “Engineering Materials”, Konark Publishers Pvt. Ltd.
6. Arora, D.S., “Text Book of Engineering Materials”, Kalyani Publishers.
7. Punmia, B.C., “Building Construction” Laxmi Publications Pvt. Ltd.
8. Kumar, S., “Building Construction”, Standard Publishers, Delhi.

CEL 252: CONCRETE TECHNOLOGY

Total Marks: 100

L	T	P
2	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Concrete as a structural material, constituent materials of concrete.

Cement: Types of cements, basic chemistry, heat of hydration, testing of cement: fineness, consistency, setting times, strength, types of Portland cements, expansive cements, pozzolanas.

Section B

Aggregates: Classification of aggregates, mechanical properties: bond, strength, toughness, hardness, physical properties, specific gravity, bulk density, porosity absorption, moisture content, bulking of s, sieve analysis, fineness modulus, grading of aggregate, maximum aggregate size.

Mix Design: Factors to be considered: water/cement ratio, durability, workability, cement aggregate content, design of mix by IS Code method.

Section C

Physical Properties of Fresh Concrete: Workability: factors affecting, methods of determination of workability, density of fresh concrete.

Section D

Mixing, Hling, Placing Compaction of Concrete: Mixers, mixing time, ready mixed concrete, pumped concrete, vibration of concrete, internal external vibrators, revibration, shotcrete.

Strength of Concrete: Porosity, gel/space ratio, total voids in concrete, factors affecting strength: water/cement ratio, relation between tensile compressive strengths; bond to reinforcement.

Permeability Durability: Permeability, sulphate attack, action of frost, frost resistance concrete.

References:

1. Neville, A. M. Brookes, J .J., “Concrete Technology” Pearson Publishers, New Delhi,(*1994*).
2. Neville, A. M., “Properties of Concrete” Pearson Publishers, New Delhi, (*2004)*.
3. Gambhir, M. L., “Concrete Technology” Tata McGraw Hill, New Delhi, (*1995)*.
4. Shetty, M. S., “Concrete Technology” S. Ch and Company, New Delhi, (*2002)*.
5. Mehta, P. K., “Microstructure of Concrete” Indian Concrete Institute ACC, Bombay, (*1997)*.

CEL253: SURVEYING

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Definition, classification of surveys, principle, distorted or shrunk scales, precision in surveying.

Chain Surveying: Instruments for measuring distances, chains, tapes, ranging – direct indirect, methods of chaining, folding opening of chain, chaining on sloping ground, errors in chaining, corrections for linear measurements, obstacle in chaining, reconnaissance, station selection, triangulation, base line measurement, limiting length of offsets, field notes.

Section B

Compass Surveying: Instruments used in traversing, bearings, meridians, declination, dip of magnetic needle, bearing of lines from included angles, local attraction, closing error its removal.

Plane Table Surveying: Introduction to plane table surveying, principle, instruments, working operations, setting up the plane table, centering, levelling, orientation, methods of plane table survey, two three point problems, Lehmann's Rules, errors.

Section C

Levelling: Definitions of terms used in levelling, different types of levels, parallax, adjustments, bench marks, classification of levelling, booking reducing the levels, rise fall method, line of collimation method, errors in levelling, permanent adjustments, corrections to curvature refraction, setting out grades, longitudinal levelling, profile levelling. Automatic levels

Section D

Contouring: Definition, representation of reliefs, horizontal equivalent, contour interval, characteristics of contours, methods of contouring, contour gradient, interpolation of contours, uses of contour maps.

Theodolite: Types of theodolites, measurement of angles, temporary permanent adjustments, closed open traverse, consecutive independent co-ordinates, advantages disadvantages of traversing, latitudes departures, closing error, Bowditch transit rules, Gales traverse table, different cases of omitted measurements.

References:

1. Punmia, B.C., “Surveying: Vol - I II”.
2. Subramanian, R., “Surveying Leveling” (OXFORD).
3. Kanetkar, T.P. Kulkarni , “Surveying Leveling Vol. - I (Part I II)”
4. Duggal, S.K., “Surveying: Vol. - I II”.
5. Ghosh, J.K., “Fundamental of Engineering Survey” Stadium Press, Roorkee.
6. Roy, S. K, “ Fundamental of Surveying”
7. Saikia Das, “ Surveying” PHI
8. Basak, N. N., “Surveying Levelling” Tata McGraw Hill, New Delhi, (*2000*).

CEL 254: WATER SUPPLY ENGINEERING

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Public Water Supply: Beneficial uses of water, water demand, per capita demand, variation in demand, causes detection prevention of wastage of water, population forecasting.

Quality Examination of Water: Necessity for examination of water impurities in water. Sampling of water, physical, chemical and bacteriological quality for domestic water supply. Drinking water quality standards criteria.

Section B

Sources of Water Supply: Surface underground sources, relation development of source in r/o quality quantity of water, development of wells. Storage reservoir balancing service storage, capacity determination by mass curves method. Intake transmission system: distribution systems: network design. Hydrology principles, zones of under-ground water.

Section C

Water Supply Drainage of Buildings: System of water supply house connections, metering, internal distribution, sanitary fittings, pipe joints, different types of pipes materials.

Water Treatment: Unit operations in water treatment, screening, plain sedimentation tank its theory, sedimentation, aided with coagulation, design of sedimentation tank, flocculation and filtration, rapid gravity filter, pressure filters,

Section D

Miscellaneous Methods of Water Treatment: Disinfection- necessity, requirements of a disinfectant, methods of disinfecting, different practices of chlorination. Aerial colour, odours taster from water, control, removal of iron manganese from water softening processes, base-exchange process, swimming pool water treatment.

References:

1. Garg, S. K., “Water Supply Engineering” Vol. I, Khanna Publishers, New Delhi, (*2003*).
2. Raju, B. S. N., “Waste Wastewater” Tata McGraw Hill, New Delhi, (1997).
3. Peavy, H. S. Rove D R, “Environmental Engineering” McGraw Hill, New Delhi, (*2003*).
4. Punmia, B. C., “Water Supply Engineering” Laxmi Publication, New Delhi, (*2002*).
5. Birdie, G. S., “Water Supply and Sanitary Engineering” Dhanpat Rai Publications, New Delhi, (*2003*).

ENL–201: WRITTEN & ORAL TECHNICAL COMMUNICATION
(Communication Skills for Scientists and Engineers)

CREDITS		
L	T	P
2	1	1

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

ote taking from lectures and reference material	
Essay and precis writing	[30%]
Slide preparation and oral presentation principles	[10%]
Written presentation of technical material	[20%]
Preparation of Bibliography	[10%]
Basics of Official Correspondence	[15%]
Preparation of bio–data	[5%]

Students should be asked to prepare and present Seminars during the practice session.

Texts / References:

1. The Chicago Manual of Style, 13th Edition, Prentice Hall of India 1989.
2. Gowers Ernest, "The Complete Plan in Words" Penguin, 1973.
3. Menzel D.H., Jones H.M., Boyd, LG., "Writing a Technical Paper", McGraw Hill, 1961.
4. Strunk, W., & White E.B., "The Elements of Style:, 3rd Edition, McMillan, 1979.
5. Turbian K.L., "A Manual for Writers of Term Papers, Thesis and Dissertations" Univ. of Chicago Press, 1973.
6. IEEE Transactions on "Written and Oral Communication" has many papers.

Course Code	**:**	**MTL–201**
Credits	**:**	**4**
L TP	**:**	**3-1-0**

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
The objective of the course is to make the understanding of random phenomena and to introduce students to the theory of probability. The course will also apprise the students to the applications of theory of probability to study the reliability of the system, noise in signal, modeling the life length of the components. The emphasis of the course is to acquaint the students with Monte Carlo simulation for the study of the random experiment and computational methods.

Total No. of Lectures – 48

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	Probability: Classical and axiomatic approach to the theory of probability, additive and multiplicative law of probability, conditional probability and Bayes theorem.	12
	SECTION - B	
2	Random Variables: Random Variables, probability mass function, probability density function, cumulative distribution function, function of random variable. Two and higher dimensional random variables, joint distribution, marginal and conditional distributions, Stochastic independence. Expectation: Mathematical expectations and moments, moment generating function and its properties.	12
	SECTION - C	
3	Probability Distributions: Binomial, Poisson, Uniform, Exponential, Gamma, Normal distribution, t– distribution, chi–square distribution, F–distribution.	12

SECTION - D		
4	Uniform Pseudo random number generation and random variable generation, Generating random variate from standard statistical distribution (discrete and continuous distribution), Monte– Carlo integration.	12

Course Outcomes:	
1	The students can apply the theory of probability in estimating the noise in the signal and reliability of the system.
2	It will give deep insight of the various courses of communication courses, like Information Theory and Coding Techniques, Advanced Digital Communication System, Theory of Estimation in communications etc.
3	It will help the students to study the engineering system with simulation.

Suggested / Reference Books:	
1	Hogg, RV, Mckean, JW and Craig, AT: Introduction to Mathematical Statistics.
2	Gupta, SC and Kapoor, K: Fundamentals of Mathematical Statistics, Sultan Chand & Co.
3	Rubinstein, R.Y.: Simulation and the Monte Carlo Method, John Wiley.
4	Probability and Statistics with Reliability by KS Trivedi, Prentice Hall.

CEP 252: CONCRETE TECHNOLOGY LABORATORY

	L	T	P
Total Marks: 100	**0**	**0**	**1**

List of Experiments

1. Standard consistency of cement.
2. Initial and final setting time of cement.
3. Soundness of cement.
4. Specific gravity of cement.
5. Compressive strength of cement.
6. Water absorption, specific gravity of fine aggregates.
7. Water absorption, specific gravity of coarse aggregates.
8. Workability of concrete by slump cone method.
9. Workability of concrete by compaction factor method.
10. Workability of concrete by Vee-Bee consistometer
11. Compressive, flexural strength of concrete.

CEP 253: SURVEYING LABORATORY

Total Marks: 100

L	T	P
0	0	1

List of Experiments

1. To range a line between two stations.
2. Plotting of details in chain survey.
3. Plotting of traverse with a compass.
4. To determine the reduced levels of stations by height of instrument rise fall method.
5. Plotting of details using plane table by method of intersection method of radiation.
6. Temporary permanent adjustments of a theodolite.
7. Measurement of horizontal angles using a theodolite by method of repetition method of reiteration.
8. Traverse adjustment using Gales' traverse table.

ENP201: Written & Oral Technical Communication

Total Marks: 100

L	T	P
0	0	1

Practical:

Students should be asked to prepare Technical Presentation on the emerging areas of Information Technology and present the same to the group of Students.

Texts / References:

1. The Chicago Manual of Style, 13th Edition, Prentice Hall of India, 1989.
2. Gowers Ernest, “The Complete Plan in Words” Penguin, 1973.
3. Menzel D.H., Jones H.M., Boyd, LG., “Writing a Technical Paper”, McGraw Hill, 1961.
4. Strunk, W., & White E.B., “The Elements of Style:, 3rdEdition, McMillan, 1979.
5. Turbian K.L., “A Manual for Writers of Term Papers, Thesis and dissertations” Univ. f

   Chicago Press, 1973. IEEE Transactions on “Written and Oral Communication” has many papers

CEL261: STRENGTH OF MATERIALS

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Concept of Equilibrium: Load, reaction; general equilibrium equations; equilibrium of a point in space; equilibrium of a member; concept of free body diagrams; displacements; concept of displacement-constraints/ supports; statical-determinacy of a problem.

Simple Stress Strains: Introduction; concept of stress strain; stress-strain curves for ductile, brittle materials; generalized Hooke's law, stress-strain diagram of ductile brittle material, statically determinate indeterminate problems, compound composite bars, thermal stresses. Elastic constants, relations between various elastic constants its use; lateral strain, volumetric strain, poisons ratio; stress strains in thin cylinders, spherical shells; thin vassals subjected to internal pressures.

Section B

Complex Stress Strains: Introduction; normal stress, tangential stress; rectangular block subjected to normal stress along across two planes, combination of normal tangential stress; concept of principal stress its computation; Mohr circle; principal strains, computation of principal stresses from the principal strains.

Section C

Shear Force Bending Moment Diagrams: Introduction to the concept of reaction diagrams—shear force bending moment; role of sign conventions; types of load, beams, supports; shear force bending moment diagrams: simply supported, overhang cantilever beams subjected to any combination of point loads, uniformly distributed varying load, moment; relationship between load, shear force bending moment; different methods for plotting a bending moment shear force diagrams.

Bending Shear Stresses: Introduction; assumptions derivation of flexural formula for straight beams; centroid of simple built up section, second moment of area; bending stress calculation for beams of simple built up section, composite sections (flitched sections); shear stress; variation of bending shear stress along the depth of section.

Section D

Columns Struts: Stability of columns; buckling load of an axially loaded columns with various end conditions; Euler's Rankine's formula; columns under eccentric load, lateral load.

Torsion of Circular Shafts: Torsion, basic assumptions, derivation of torsion equation; power transmitted by shafts; analysis design of solid hollow shafts based on strength stiffness; sections under combined bending torsion, equivalent bending torsion.

Failure Theories: Maximum principal stress theory, maximum shear stress theory, distortion energy theory, strain energy theory, constant analysis of thin cylinder

References:

1. Ramamrutham, S., " Strength of Material"
2. Popov, E., " Mechanics of Material"
3. Rajput, "Strength of Material"
4. Singh, S., "Strength of Materials"

CEL262: FLUID MECHANICS

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Fundamental Concepts of Fluid Flow: Flow characteristics, Classification, Fluid properties, Foundations of flow analysis.

Fluid statics: Fluid pressure and its measurement, hydrostatic forces on submerged bodies, buoyancy and floatation, liquids in relative equilibrium.

Section B

Fluid kinematics: Continuity equation, rotational and irrotational flow, circulation and vorticity, velocity potential and stream function, flow net.

Fluid dynamics: Euler's equation, Bernoulli's equation and its applications, impulse momentum theory and its application.

Section C

Flow through pipes: Darcy-Weisbach equation, energy losses in pipelines, equivalent pipes, multiple pipe systems, siphon, three reservoir problem, and water hammer.

Laminar and Turbulent flows: Reynolds experiment, Laminar flow between parallel plates, Laminar flow in pipes, characteristics of turbulent flow, Turbulent flow in smooth and rough pipes.

Section D

Dimensional analysis and similitude: Dimensional homogeneity, Buckingham's π theorem, important dimensional numbers and their significance, geometric, Kinematic and dynamic similarity, model studies.

Boundary Layer Theory and Applications: Concepts of boundary layer, boundary layer thickness and equations, momentum integral equation, boundary layer separation and its control, cavitation. Circulation, Drag and lift on immersed bodies, Magnus effect.

References:

1. Ojha, Berndtsson and Chandramouli, Fluid Mechanics and Machinery
2. A.K. Jain, Fluid Mechanics
3. P.N.Modi and S.M.Seth, Hydraulics and Fluid Mechanics
4. Wiley and Streeter, Fluid Mechanics
5. F.M. White, Fluid Mechanics Course No. C

CEL 263: CONSTRUCTION PLANNING MANAGEMENT

L	T	P
3	0	0

Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Need of project planning management, value engineering, time value of money, construction schedule activity event, bar chart, milestone chart, uses draw backs.

PERT: Construction of PERT network, time estimate network analysis, forward pass backward pass, event slack, critical path, data reduction.

Section B

CPM: Definitions, network construction, fundamental rules determination of project schedule, activity time estimates, float types, their significance in project control, critical path.

Three Phase Application of CPM: Planning scheduling controlling, updating an arrow diagram, time grid diagram, resource scheduling

Section C

Cost Analysis Contract: Types of project cost, cost time relationships cost slopes, conducting a crash programme, determining the minimum total cost of a project.

Factor Affecting Selection of Equipment: Type of equipment, depreciation cost, operating cost, economic life of equipment, maintenance repair cost.

Section D

Earth Moving Machinery: Tractors related equipment, bulldozers, scrapers, power shovels, dragline, hoes etc.

Construction Equipment: Grading / proportioning, batching mixing, types of mixers, concrete pumps, placing compacting concrete.

Hoisting Transporting Equipment: Hoists, winches, cranes, belt conveyors, truck etc.

References:

1. Srinath, L. R., “PERT CPM” Affiliated East-West press (P) Ltd., New Delhi, (*1999*).
2. Modi, P. N., “PERT CPM” Standard Book House Delhi, (*1995*).
3. Wiest, J. D., “A Management Guide to PERT CPM” Prentice Hall of India (P) Ltd, New Delhi, (*1997*).
4. Peurify, R. L., “Construction, Planning Equipment Management” McGraw Hill Book Company, New Delhi, (*1996*).
5. Sharma, S. C., “Construction Equipment its Management” Khanna Publishers, Delhi, (*1990*).

CEL 264: SOIL MECHANICS

L	T	P
3	1	0

Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Basic Concepts: Definition of soil, soil mechanics common soil problem in civil engineering field. Principal types of soils. Important properties of very fine soil i.e. adsorbed water, base exchange, soil structure. Characteristics of main clay mineral groups. Basic definitions in soil mechanics. Weight volume relationship.

Section B

Index Properties: Determination of index properties, classification of coarse grained and fine grained soils.

Permeability Seepage: Concept of effective stress and pore water pressure, seepage pressure, critical hydraulic gradient quick sand condition, phreatic line. Capillary phenomenon in soil. Darcy's law-its validity, seepage velocity. Co-efficient of permeability its determination, Factors affecting 'K' brief discussion.

Section C

Consolidation: Difference between compaction and consolidation, Concept of various consolidation characteristics i.e. a_v, m_v, primary and secondary consolidation. Terzaghi's method for one-dimensional consolidation. Consolidation test. Determination of C_v from curve fitting methods. Normally consolidated and over consolidated clays.

Stress Distribution: Boussinesq's equation for a point load, uniformly loaded circular rectangular area, pressure distribution diagrams. Newmark's chart its construction. Two- to – one method of load distribution. comparison of Bossinesq Westerguard analysis for a point load.

Section D

Compaction: Definition of compaction, concept of optimum moisture content, zero air void line, standard and modified proctor test. Factors affecting compaction. Effect of compaction on soil properties, field compaction methods and their suitability.

Shear Strength: Stress analysis of a two - dimensional stress system by Mohr circle. Coulomb's law of shear strength, Relations between principle stresses at failure, shear strength tests, derivation of Skempton's pore pressure parameters. Stress strain and volume change characteristics.

Books Recommended:

1. Terzaghi, K. Peck, R. B., “Soil Mechanics in Engineering Practice” John Wiley Sons, New York, (*1995)*.
2. Terzaghi, K., “Theoretical Soil Mechanics”, John Wiley Sons, New York, (*1943)*.
3. Ranjan, G. Rao, A.S.R., “Basic Applied Soil Mechanics” New Age International Pvt. Ltd., Publishers, New Delhi, (*2000)*.
4. Murthy, V. N. S., Principles of Soil Mechanics Foundation Engineering “, UBSPD, (2001).
5. Donald, P., Coduto, "Geotechnical Engineering: Principles Practices”, Pearson Education, Eastern Economy Edition, (*2000*)

CEL265: NUMERICAL METHODS FOR CIVIL ENGINEERING

Total Marks: 100

L	T	P
2	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Approximation in Numerical Computation: Truncation rounding errors, fixed floating-point arithmetic, Propagation of errors.

Interpolation: Newton forward/backward interpolation, Lagrange's Newton's divided difference Interpolation.

Section B

Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule, Expression for corresponding error terms.

Section C

Numerical Solution of a System of Linear Equations: Gauss elimination method, Matrix inversion, LU Factorization method, Gauss-Seidel iterative method.

Numerical Solution of Algebraic Equation: Bisection method, Regula-Falsimethod, Newton-Raphson method.

Section D

Numerical Solution of Ordinary Differential Equation: Euler's method, Runge-Kutta methods, Predictor-Corrector methods Finite Difference method.

Reference:

1. C.Xavier, "C Language Numerical Methods".
2. Dutta Jana, "Introductory Numerical Analysis".
3. Scarborough, J.B., "Numerical Mathematical Analysis".
4. Iyengar, J., Jain "Numerical Methods (Problems Solution)".

CEP 261: STRENGTH OF MATERIALS LABORATORY

	L	T	P
Total Marks: 100	**3**	**1**	**0**

1. Draw stress strain curve for ductile brittle material in tension.
2. Draw stress strain curve for ductile brittle material in compression.
3. Draw shear stress, shear strain curve for ductile brittle material in torsion strength testing
4. Draw load deflection curve for spring in loading unloading conditions.
5. To determine the hardness of the given material by Rockwell Brinell hardness testing machine.
6. To determine the fatigue strength of the material.
7. To determine the impact strength by Izod Charpy test.
8. To determine the load carrying capacity of the leaf spring.
9. To test a mild steel cast iron specimen in double shear.

CEP 262: FLUID MECHANICS LABORATORY

	L	T	P
Total Marks: 100	**0**	**0**	**1**

1. To study the transition from laminar to turbulent flow in a pipe.
2. Verification of Stokes law
3. To draw flow net by electrical analogy method
4. Determination of elements of hydraulic jump.
5. Discharge flow profile of a broad crested weir.
6. To determine the viscosity of a given liquid by capillary-tube-viscometer.
7. To determine Manning's co-efficient of roughness for the bed of a given flume.
8. To measure the velocity distribution in a rectangular flume to determine the energy momentum correction factors.
9. To calibrate a current meter.
10. To study the flow over a hump placed in an open channel.
11. Demonstration of surges in an open channel.
12. Demonstration of forced vortex.

CEP 264: SOIL MECHANICS LABORATORY

	L	T	P
Total Marks: 100	**0**	**0**	**1**

List of Experiments

1. Grain Size Analysis-Sieve Analysis and Hydrometer Test.
2. Determination of water content of soil by oven drying method and calcium carbide test.
3. Determination of in- situ density by core cutter method.
4. Determination of in- situ density by sand replacement method.
5. Determination of Atterberg's Limits using Casagrande's apparatus
6. Determination of specific gravity of soil solids by pycnometer method.
7. Direct shear test on a given soil sample.
8. Unconfined compression test for fine-grained soil.
9. Triaxial shear test.
10. Determination of permeability by constant head method/ variable head method.
11. Standard Proctor test
12. Modified proctor test
13. Consolidation test

CEL 351: THEORY OF STRUCTURE-I

L	T	P
3	1	0

Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Need of analysis, techniques of structural idealization, basic tools of analysis, reactions in structure, notations sign conventions, free – body diagrams, static determinacy, stability of structures, principle of superposition, loads on structures.

Plane Trusses: Introduction, member arrangement in a truss, stability determinacy, roof bridge trusses, analysis of trusses, notations sign conventions, equations of condition, zero load test, classification of trusses

Section B

Deflection of Beams: Introduction, direct integration method, moment – area method, conjugate beam method, Principle of virtual work, unit load method, Betti's law, Maxwell's law, Castigliano's theorem.

Combined Bending Axial Loads: Introduction, limit of eccentricity for no tension in the section, core of the section, middle third rule, wind pressure on chimneys, forces on dams

Section C

Rolling Loads Introduction to rolling loads influence lines, determination of shear force, bending moment at a section absolute shear force bending moment due to single point load, uniformly distributed load, several point loads etc.

Influence Lines: Introduction, moving loads, influence lines, influence lines for reactions, shear force bending moment, influence lines for beams, girders with floor beams, trusses arches, absolute maximum B. M. and S. F, Muller Breslau Principle.

Section D

Arches: Introduction, curved beams, arch versus a beam, three hinged arch, moment, shears normal thrust in three hinged arches

Cables Suspension Bridges: Introduction, shape of a loaded cable, cable carrying point loads UDL, cables with ends at different level, cable subjected to temperature stresses, suspension bridge with two hinged three hinged stiffening girders, influence lines.

Statically Determinate Space Trusses: Concurrent forces in space, moment of force, constraint of point in space, tension coefficient method, simple space trusses, method of sections.

References:

1. Utku, S., Norris, C. H. Wilbur, J. B., “Elementary Structural Analysis, McGraw Hill, New York, (*1990)*.
2. Jain, A. K., “Elementary Structural Analysis” Nem Chand Brothers, Roorkee, (*1990*).
3. Reddy, C. S., “Basic Structural Analysis” Tata McGraw Hill, New Delhi, (*2003*).
4. Hibbeler, C., “Structural Analysis” Pearson Publishers, New Delhi, (*2002*).
5. Punmia, B. C., Jain, A. K. Jain, A. K. “Theory of Structures" Luxmi Publications, (*2000).*
6. Ramamrutham, S. Narayan, R., “Theory of Structures:” Dhanpat Rai Sons, New Delhi, (*1996*).

CEL 352: DESIGN OF STEEL STRUCTURES-I

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Riveted Welded Joints: Rivets riveting, stresses in rivets, strength failure of riveted joints, riveted joints in framed structures, types of welds welded joints, stresses in welds, design of welds, eccentrically loaded welded joints

Tension Members: Types of tension members, net gross areas, permissible stresses. Design of members subjected to axial loads, combined bending moments axial loads, lug angles. Tension splice.

Section B

Compression Members: Failure modes of columns, end conditions effective length of columns, various empirical formulae. IS code formula, General codal provisions for design of compression members, built up compression members, lacing battening of compression members, splicing of compression members.

Section C

Column Bases Foundations: Types of column bases, design of slab base, Gusseted base grillage foundations.

Design of Flexural Members: Failure modes permissible stresses, design of laterally supported unsupported beams, web crippling, web buckling, compound beams.

Section D

Design of Plate Girders: Components of a plate girder, basic design assumptions, stiffeners in plate girders, design of various components of a welded riveted plate girder.

Roof Trusses: Types of roof trusses loads on roof trusses, calculation of forces due to combination of different loads, Design of members joints

References:

1. Chra, R., “Design of Steel Structures” Standard Publishing House, (*1999)*.
2. Raghupathi, M., “Design of Steel Structures” Tata McGraw-Hill, New Delhi, (*1998)*.
3. Arya, A. S. Ajmani J L, “Design of Steel Structures” Nem Ch Bros. Roorkee, (*2000)*.
4. Kazimi, S. M. A. Jindal, R. S., “Design of Steel Structures” Prentice Hall of India, New Delhi, (*1999)*.
5. Dayaratnam, P., “Design of Steel Structures” Wheeler Publishers, New Delhi, (*1999).*

CEL 353: WATER RESOURCES ENGINEERING-I

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Importance of irrigation engineering, purposes of irrigation, objectives of irrigation, benefits of irrigation, advantages of various techniques of irrigation- - Furrow irrigation, boarder strip Irrigation, basin irrigation, sprinkler irrigation , drip irrigation.

Methods of Irrigation: Advantages disadvantages of irrigation, water requirements of crops, factors affecting water requirement, consumptive use of water, water depth or delta, duty of water, base period, relation between delta, duty base period, and soil crop relation-ship soil fertility.

Section B

Canal Irrigation: Classifications of canals, canal alignment, inundation canals, Bhara irrigation, advantages disadvantages, silt theories-Kennedy's theory, Lacey's theory, drawbacks in Kennedy's and Lacey's theories, comparison of Lacey's Kennedy's theories, design of unlined canals based on Kennedy and Lacey's theories.

Lined Canals: Types of lining, selection of type of lining, Economics of lining, maintenance of lined canals, silt removal, strengthening of channel banks, measurement of discharge in channels, design of lined canals, methods of providing drainage behind lining.

Section C

Losses in Canals, Water Logging Drainage: Losses in canals- evaporation seepage, water logging, causes ill effects of water logging anti water logging measures. Drainage, classification of drains - surface subsurface drains, design considerations for surface drains, advantages maintenance of tile drains.

Investigation Preparation of Irrigation Projects:
Classification of project, project preparation-investigations, design of works drawings, concept of multi - purpose projects, major, medium miner projects, planning of an irrigation project, economics and financing of irrigation works. Documentation of project report.

Section D

Tube well Irrigation: Types of tube wells - strainer type, cavity type slotted type. Type of strainers, aquifer, porosity, uniformity coefficient, specific yield and specific retention, coefficients of permeability, transmissibility storage. Yield or discharge of a tube well, assumptions, Theim's and Dupuit's formulae, Limitations of Theim's Dupuit's formulae. Interference of tube wells with canal or adjoining tube-wells, causes of failure of tube wells, optimum capacity, duty delta of a tube well. Rehabilitation of tube well.

River Training Works: Objectives, classification of river-training works, design of guide banks. Groynes or spurs - Their design classification ISI. Recommendations of approach embankments afflux embankments, pitched Isls, Natural cut-offs Artificial cut-offs design Considerations

References:

1. Sharma, S.K., "Principles and practice of Irrigation Enginnering". S. Ch, Limited.
2. Punmia, B.C. "Irrigation and Water Power Enginnring", Pe B.B.Lal; Laxmi Publications (p) Ltd
3. Singh, B., "Fundamentals of Irrigation Engineering" Nem Ch and Bros.
4. Sahasrabudhe, S.R. "Irrigation Engineering and Hydraulic Structure" S. K. Kataria and Sons.
5. Varshney, Gupta and Gupta, "Irrigation Engineering and Hydraulic Structure" Nem Ch Brothers.
6. Garg, S. K. "Irrigation Engineering and Hydraulic Structure" Khanna Publishers.

CEL 354: RAILWAYS AIRPORT ENGINEERING

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

(Railway Engineering)

Introduction to Railway Engineering: History of Railways, development of Indian Railway, organization of Indian Railway, important statistics of Indian Railways. Railway gauges: Definition, gauges on world Railways, choice of gauge, uniformity of gauge, loading gauge, construction gauge.

Railway Track: Requirements of a good track, track specifications on Indian Railways, detailed cross-section of single/double track on Indian Railways. Components of Railway Track: Rails, sleepers, ballast, sub grade formation, track fixtures and fastenings, coning of wheels, tilting of rails, adzing of sleepers, rail joints, creep of rails.

Geometric Design of Railway Track: Alignment, gradients, horizontal curve, super elevation, equilibrium cant, cant deficiency, transition curves.

Points Crossings: Functions, working of turnout, various types of track junctions their layouts, level-crossing.

Section B

Railway Stations and Yards: Site selection, classification and layout of stations, Marshalling yard, locomotive yard, equipment at Railway Stations and yards

Signaling Interlocking: Objectives, classification of signals, types of signals in stations yards, automatic signaling, principal of interlocking.

Modernization of Railway Tracks: High speed tracks, improvement in existing track for high speed, Ballast less Track, MAGLEV, TACV track.

Section C

(Airport Engineering)

Introduction to Airport Engineering: Air transport scenario in India stages of development, national international organizations.

Airport Planning: Aircraft characteristics, factors for site selection, airport classification, general layout of an airport. Obstructions zoning laws, imaginary surfaces, approach zones turning zones.

Section D

Runway Orientation Design: Head wind, cross wind, wind rose diagram, basic runway length, Corrections, geometric design elements, runway configuration.

Taxiway Aircraft Parking: Aircraft parking system. Main taxiway, exit taxiway, separation clearance, holding aprons.

Visual Aids: Marking lighting of runway taxiway, ling direction indicator, wind direction indicator, IFR/VFR.

References:

1. Chra, S., Aggarwal, “Railway Engineering”, M.M. Oxford University Press, New Delhi, (*2007*).
2. Saxena, S.C. and Arora, S.P., “A Text Book of Railway Engineering”, Dhanpat Rai Sons, Delhi, (*1997*).
3. Mundrey, J. S., “Railway Track Engineering”, McGraw Hill Publishing Co., (*2009*).
4. Khanna, S.K., Arora, M.G. and Jain, S.S., “Airport Planning Design”, Nem Ch and Bros. Roorkee, (*1999*).
5. Horenjeff, R. and McKelvey, F., “Planning Design of Airports”, McGraw Hill Company, New York, (*1994*).
6. Norman, J., Ashford, S.M. and Paul, H.W., “Airport Engineering”.

(Department Elective–I)
CEL 355: BUILDING CONSTRUCTION

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Brick Masonry: Definitions of various terms used, bond – definition, need scope, type of bonds – stretcher bond, header bond, English bond Flemish bonds, their merits demerits.

Stone Masonry: Rubble ashlars work.

Hollow Block Masonry: Hollow cement concrete block masonry hollow clay block masonry.

Walls: Types

(i) Load bearing
(ii) Non-load bearing walls, Thickness considerations.

Section B

Damp Proofing: Causes ill – effects, preventive measures

Arches Lintels: Definitions of various terms used in arches, types – flat, segmental, semi – circular horse – shoe, brick stone arches, types of lintels, their merits demerits.

Floors: Constituents, various types of floors commonly used their suitability for different buildings, constructional details of concrete terrazzo floors.

Section C

Doors Windows: Location sizes, types of doors windows, method of fixing door window frame in walls, ventilators.

Sloping roofs: Definitions of terms used, wooden trusses – king post queen post truss, steel trusses – fink, fan north light truss roofs, Jack arch roofs.

Section D

Stairs Staircases: Definition of terms used, essential requirements, proportioning of steps, types – straight flight, quarter turn, half turn spiral staircases, ramps, escalators lifts.

Footings: Types details

Miscellaneous Topics (to be covered briefly): Plastering pointing. White washing, colour washing, distempering painting, Scaffolding, underpinning shoring, building bye-laws.

References:

1. Rangwala, S. C., “Engineering materials” Charotar Publishing House, An,(*2000*).
2. Bindra Arora, “Building Construction” Dhanpat Rai Publications (P) Ltd, New Delhi, (*2003)*.
3. Sinha, S. K. Jha, J., “Building Construction” Khanna Publishers, New Delhi, (2001).
4. Rangawala, S C, “Building Construction” Charotar Publishing House, An, (1993).
5. Ghose, D. N., “Materials of Construction” Tata McGraw Hill, New Delhi, (*2003)*.

(Department Elective–I)
CEL 356: DISASTER MANAGEMENT

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction to Disaster Management: Define describe disaster, hazard, emergency, vulnerability, risk disaster management; Identify describe the types of natural non-natural disasters. Important phases of Disaster Management Cycle.

Disaster Mitigation Preparedness: Natural hazards: causes, distribution pattern, consequences mitigation measures for earth quake, tsunami, cyclone, flood, slide drought etc. Man-made hazards: causes, consequences mitigation measures for various industrial hazards/disasters, Preparedness for natural disasters in urban areas.

Section B

Hazard Risk Assessment: Assessment of capacity, vulnerability risk, vulnerability risk mapping, stages in disaster recovery associated problems.

Emergency Management Systems (EMS): Emergency medical essential public health services, response recovery operations, reconstruction rehabilitation.

Section C

Capacity Building: Gender sensitive disaster management approach inculcate new skills sharpen existing skills of government officials, voluntary activists, development of professional elected representative for effective disaster management, role of media in effective disaster management, overview of disaster management in India, role of agencies like NDMA, SDMA other International agencies, organizational structure, role of insurance sector, DM act NDMA guidelines..

Application of Geoinformatics Advanced Techniques: Use of Remote Sensing Systems (RSS) GIS in disaster Management, role of knowledge based expert systems in hazard scenario, using risks-time charts to plan for the future, early warning systems.

Section D

Integration of public policy: Planning design of infrastructure for disaster management, community based approach in disaster management, methods for effective dissemination of information, ecological sustainable development models for disaster management.

Case Studies: Lessons experiences from various important disasters with specific reference to civil engineering.

References:

1. Iyengar, C.B.R.I "Natural Hazards in The Urban Habitat" Tata McGraw Hill.Pub.
2. Leicester, T. R., "Natural Disaster Management" Jon Ingleton (Ed), Published.
3. Singh, R.B., "Disaster Management", Rawat Publications.
4. ESCAP: Asian The Pacific Report on Natural Hazards Natural Disaster Reduction.
5. www.http//ndma,gov,in
6. Singh, J. "Disaster Management–Future Challenges Opportunities" I.K. International Publishing House.

(Department Elective–I)
CEL 357: MASS TRANSPORTATION SYSTEM

L	T	P
3	0	0

Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.
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Section A

History role of transit, recent trends in transit. Mass transportation characteristics

Section B

Urban mass transportation planning, dem projection, mass transportation system performance.

Section C

Economic evaluation methods, terminals their functions, design, typical requirement, scheduling vehicle dispatch policy, spacing of bus stops, route spacing performance, reserved bus lanes,

Section D

Operational management issues in transit planning, rail transit systems, underground transportation

References:

1. Hutchinson, B.G., “Introduction to Urban Transportation Systems Planning”, McGraw Hill. New York, (*1974*).
2. Kadiyali, L.R., “Traffic Engineering Transport Planning,” Khanna Publishers, (*1997*).
3. Vukan R. Vuchic, “Urban Public Transportation Systems Technology” Prentice Hall Inc., N.J., (*1981*).

(Department Elective–II)
CEL 358: TRAFFIC ENGINEERING

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Elements of traffic engineering, components of traffic system – road users, vehicles, highways control devices.

Vehicle Characteristics: IRC standards, design speed, volume, highway capacity levels of service, capacity of urban rural roads, PCU concept its limitations.

Section B

Traffic Stream Characteristics: Traffic stream parameters, characteristics of interrupted uninterrupted flows.

Traffic Studies: Traffic volume studies, origin destination studies, speed studies, travel time delay studies, parking studies, accident studies.

Traffic Regulation Control: Signs markings, traffic System management, At-grade intersections, channelization, roundabouts.

Section C

Traffic Signals: Pre-timed traffic actuated. Design of signal setting, phase diagrams, timing diagram, signal co-ordination.

Grade Separated Intersections: Geometric elements for divided access controlled highways expressways.

Section D

Traffic Safety: Principles practices, road safety audit.

Intelligent Transportation System: Applications in traffic engineering

References:

1. William, R.M. Roger, P.R., “Traffic Engineering”, Prentice Hall.
2. Hobbs, F.D., “Traffic Planning Engineering”, Pergamon Press.
3. Khisty, C.J. Kent, B.L., “Transportation Engineering – An Introduction”, Prentice Hall of India Pvt. Ltd.
4. Kadiyali, L.R., “Traffic Engineering and Transport Planning”, Khanna Publishers, New Delhi.
5. Mannering, “Principles of Highway Engineering and Traffic Analysis”, Wiley Publishers, New Delhi.

(Department Elective–II)
CEL 359: CONSTRUCTION LAWS

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Indian Contract Act 1972 – Valid contract, voidable contract, void – sections related to these. Definitions, interpretation.

Section B

Arbitration conciliation Act of 1996- Arbitration agreement, arbitrator tribunal, qualifications of arbitrator, arbitration proceedings award. Conciliation agreement, proceedings, settlement

Section C

Provisions of various labour laws-Workmen's compensation Act 1923; disablement, total permanent disablement, temporary disablement, formula for compensation; minimum wages act, 1948; payment of bonus Act, 1965; weekly holidays Act, 1942; payment of wages Act, 1936; Inter-state migrant labour act, 1979; employees insurance Act, 1948.

Section D

The building other construction workers (regulation of employment conditions of service) Act, 1996 rules 1998.

References:

1. Patil, B.S. "Legal Aspects of Building Engineering Contracts", (*1974*).
2. Bare Acts referred to above.

(Department Elective–II)
CEL 360: ADVANCED ENVIRONMENTAL ENGINEERING

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Water Pollution: Water borne disease, chlorination of water on small scale, examination of water and health criteria for water supplies, fluoridation of water. Swimming pool sanitation health education. Hosrock's apparatus and sampling.

Ecology: Introduction, biosphere, scope, ecosystem, population regulation, national cycles. Energy flow forests and wild life, human activity, greenhouse effect.

Section B

Air Pollution: Composition, air of occupied rooms, discomfort, indices of thermal comfort, comfort zones, air pollution sources, pollutant, metrological conditions, indications of air pollution, health and other aspects of air pollution, prevention and control disinfections of air.

Ventilation: Concept, standards of ventilation, types of ventilation.

Lighting: Requirements of good lighting, measurement of light, natural lighting, light measurement units, measurement of day light, artificial lighting, method of artificial illumination, lighting standards.

Section C

Noise Pollution: Definition, effect of noise, exposure, noise control.

Radiation: Source of radiation exposure, type of radiation, radiation units, biological effect of radiation, radiation protection.

Section D

Metrological Environment: Atmosphere pressure, measurement effects of atmospheric pressure on health.

Air Temperature: Effects of heat-stress, preventive measures effect of cold stress.

Housing: Criteria for good housing, house standards, rural housing, housing and health overcrowding.

Excreta Disposal: Public health, importance, extent of problem how diseases is carried from excreta sanitation barrier, method of excreta disposal, excreta disposal in un-sewered area.

References:

1. Garg, S. K., "Environmental Engineering", Khanna publishers New Delhi, (*2003*).
2. Rao, C. S., "Environmental Engineering", McGraw Hill Book Company, (*2001*).
3. Metcalf, Eddy, "Waste Water Engineering- Treatment Disposal Reuse", Tata- McGraw Hill Publishing Company limited, New Delhi, (*2003*).
4. Masters, G. M., "Introduction to Environmental Engineering Science" Prentice Hall of India, New Delhi.
5. Eckenfelder, W W, "Industrial Water Pollution control" McGraw Hill, New Delhi, (*1989*).

CEP 351: THEORY OF STRUCTURE-I LABORATORY

Total Marks: 100

L	T	P
0	0	1

List of Experiments

1. Deflection of a simply supported beam verification of Clark-Maxwell's theorem.
2. To determine the flexural rigidity of a given beam.
3. To verify the moment- area theorem for slope deflection of a given beam.
4. Deflection of a fixed beam influence line for reactions.
5. Deflection studies for a continuous beam influence line for reactions.
6. Study of behavior of columns struts with different end conditions.
7. Experiment on three-hinged arch.
8. Experiment on two-hinged arch.
9. Deflection of a statically determinate pin jointed truss.
10. Forces in members of redundant frames.
11. Experiment on curved beams.
12. Unsymmetrical bending of a cantilever beam.

CEL 381: HIGHWAYS ENGINEERING

Total Marks: 100

L	T	P
2	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Importance role of transportation systems; different modes of transportation, historical development of road construction, highway economics.

Highway Planning Project Preparation: Planning surveys, highway alignment, highway location surveys, soil material surveys. Highway projects: drawing report.

Section B

Highway Geometric Design: Cross-sectional elements, camber, sight distance-definition analysis of stopping sight passing sight distances, passing zones. Design of horizontal alignment-super elevation. Extra widening on curves, transition curves. Design of vertical alignment, gradients, types of vertical curves their design.

Section C

Highway Materials Construction: Desirable properties of soil, road aggregates, bitumen, cement concrete as highway materials. Various types of roads their construction-earth roads, gravel roads, W.B.M., bituminous, surface treatment, penetration macadam, premix carpet, bituminous concrete, sheet asphalt quality control during construction.

Pavement Design: Design of flexible rigid pavements.

Section D

Highway Drainage Maintenance: Importance of drainage maintenance, surface drainage subsoil drainage, construction in Water-logged areas, pavement failures, pavement evaluation, maintenance strengthening measures.

Highway Economics Financing: Total transportation cost, economic analysis, sources of highway financing.

References:

1. Khanna, S.K., Justo, C.E.G. “Highway Engineering”, Nem Chand Brothers, Roorkee, (*2002)*.
2. Kadiyali, L.R. “Principles Practice of Highway Engineering”, Khanna Publishers, New Delhi, (*1997)*.
3. Flaherty, C.A.O. “Highway Engineering”, Volume 2, Edward Arnold, London, (*1986).*
4. Sharma, S.K. “Principles, Practice and Design of Highway Engineering”, S. Ch and Company Ltd., New Delhi, (*1985*)
5. Mannering, “Principles of Highway Engineering and Traffic Analysis”, Wiley Publishers, New Delhi.
6. Rao, G. V., “Principles of Transportation Highway Engineering” Tata McGraw- Hill, New Delhi, (*1996)*.
7. Bhanot, K. L., Highway Engineering, S. Ch and Company (P) Ltd. New Delhi, (*1990).*
8. Ahuja, T. D., “Highway Engineering” Standard Book House Delhi, (*1995)*.

CEL 382: THEORY OF STRUCTURE-II

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Statically Indeterminate Beams Frames: Introduction, types of supports-reaction components, external redundancy, statically indeterminate beams frames, degree of redundancy.

Fixed Continuous Beams: Bending moment diagrams for fixed beams with different loadings, effect of sinking of supports, degree of fixity at supports, advantages disadvantages of fixed beams, continuous beams, Clayperons theorem of three moments, various cases of load geometry of continuous beams.

Section B

Slope Deflection Method: Fundamental equations, applications to continuous beams portal frames, side sway in portal frames.

Moment Distribution Method: Basic propositions, stiffness of a member, distribution theorem, carry-over theorem, relative stiffness, distribution factors, applications to continuous beams, portal frames with without side sway, analysis of multi-storeyed frames, method of substitute frame.

Rotation Contribution method: Basic concepts, rotation factor, application to continuous beams, portal frames multistoried frames, story shear.

Section C

Approximate Methods of Structural Analysis: Portal method, cantilever method, substitute frame method.

Strain Energy: General principles, strain energy due to axial loading bending, law of reciprocal deflections, Castigliano's first theorem, beam deflections using Castigliano's first theorem, minimum strain energy, Castigliano's second theorem, analysis of statically indeterminate beams portal frames.

Section D

Redundant Frames: Order of redundancy, frames with one two redundant members. Stresses due to lack of fit, the trussed beam, portal frames.

Analysis of two Hinged Arches

Influence Lines for Indeterminate Structures: Muller Breslau Principle, Influence lines for shear force, bending moment reactions in continuous beams, balanced cantilevers rigid Frames.

References:

1. Reddy, C. S., "Basic Structural Analysis" Tata McGraw Hill, New Delhi, (*2003*).
2. Wang, C. K., "Intermediate Structural Analysis" McGraw Hill, (*1998*).
3. Punmia, B. C., "Theory of Structures" Luxmi Publications, New Delhi, (*1996*).
4. Sinha, N. C., "Advanced Theory of Structures" Dhanpat Rai Publications, New Delhi, (*2000*).
5. Ramamrutham, S. Narayan, R., "Theory of Structures:" Dhanpat Rai and Sons, New Delhi, (*1996*).

CEL 383: ESTIMATION AND COSTING

L	T	P
2	1	0

Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Estimates: Types, complete set of estimate, working drawings, site plan, layout plan, index plan, plinth area, administrative approval and Technical Sanction.

a) Estimate of buildings
b) Estimate of R. C.C. works
c) Estimate of sloped roof and steel structures
d) Estimate of water supply and sanitary works
e) Estimates of roads (a) Earthwork (b) Bridges and culverts c) Pavement
f) Estimate of Irrigation works.

Section B

Analysis of Rates: For earthwork, concrete works, D. P. C., Brickwork, stone masonry, plastering, pointing, road work, carriage of materials.

Section C

Specifications: General specification for different classes of building, detailed specifications for various Civil Engineering Works.

Section D

Contracts: Types of contracts, tender, tender notice, tender form, submission and opening of tender, earnest money, security money, measurement book, muster roll, piecework agreement and work order

Accounts: Division of accounts, cash, receipts of money, cashbook, temporary advance, imprest and accounting procedure.

Arbitration: Arbitration, arbitrator and arbitration act, powers of arbitrator, arbitration awards.

References:

1. Estimating and Costing by B.N. Datta, UBSPD, New Delhi
2. Estimating and Costing by G.S. Birdie, Dhanpat Rai Publication New Delhi .
3. Estimating and Costing by V.N. Chakravorty, Calcutta
4. Civil Engg. Contracts & Estimates by B.S. Patil, Orient-Longman Ltd., New Delhi.
5. Estimating and Costing, Kohli D. D.,Kohli and R.C., S.Chand & Company,New Delhi,2004
6. Building and Public Works Administration, Estimating and Costing Spence Gedder, Newnes Publishers,London,UK,1950.

CEL384: WASTE WATER ENGINEERING

Total Marks: 100

L	T	P
2	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Terms definitions, systems of sanitation their merits demerits, system of sewerage, choice of sewerage system suitability to Indian conditions. Design planning of a sewage system.

Design of Sewers: Quantity of sanitary storm sewage flow, forms of sewers, conditions of flow in sewers, sewers of equivalent section, self-cleansing limiting velocity, hydraulic formulas for flow of sewerage in sewers their design.

Construction Maintenance of Sewers: Sewer appurtenances, Materials for sewers, laying of sewers, joints in sewers, testing of sewers pipes, Maintenance operations precaution before entering a sewer. Excavating trenches.

Section B

House Drainage: Principles of house drainage, traps, Inspection chamber Indian European type W. C., Flushing Cisterns soil waste anti-siphonage pipes, plumbing systems.

Characteristics Testing of Sewage: Composition of sewage, sampling, physical and chemical analysis of sewerage, biological decomposition of sewage, kinetics of organic waste stabilization. Populating equivalent relative stability.

Section C

Treatment of Sewage: Unit processes of waste water treatment, screens, grit chambers, detritus tank, skimming tank, grease traps, sedimentation, chemical treatment, aerobic biological treatment, trickling filter (LRTF and HRTF), activated sludge processes, anaerobic treatment, units-sludge digesters biogas plants.

Section D

Low Cost Waste Water Treatment Units: Oxidations ponds, lagoons, ditches, septic tanks imhoff tanks, theory, design, advantages disadvantages.

Sewage Disposal: Dilution, self-purification of streams, oxygen deficiency of polluted streams, oxygen sag serve, deoxygenation. Dilution in seawater, disposal by treatment. Effluent irrigation sewage farming. Sickness its preventive measures.

References:

1. Peavy, H. S. Rowe, D. R., “Environmental Engineering” McGraw Hill, New Delhi (*2002)*.
2. Garg, S. K., “Environmental Engineering-Vol. II”, Khanna Publishers, New Delhi, (*2003*).
3. Birdie, G. S., “Water Supply and Sanitation Engineering” Dhanpat Rai Publisher (P) Ltd., New Delhi, (*2003)*.
4. Fair, G. M. Geyer, J. C., “Water Supply and Waste Water Disposal” (*2002*).
5. Nathanson, J. A., “Basic Environmental Technology” Prentice Hall of India, New Delhi. (*1999*).

CEL 385: DESIGN OF CONCRETE STRUCTURE-I

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Plain reinforced concrete, objectives of design. Structural systems. Introduction to design philosophies.

Analysis of Beams: Working stress method, Assumptions made in theory of reinforced concrete construction, moment of resistance of singly, doubly reinforced flanged beams.

Limit State Method: Assumptions in analysis, Analysis of singly doubly reinforced rectangular sections, analysis of singly reinforced flanged sections.

Section B

Design of Beams for flexure: Codal provisions for design as per IS 456:2000 according to working stress limit state method, design of singly doubly reinforced sections, design of flanged sections.

Design for Shear, Bond and Torsion: Shear Stresses in homogeneous rectangular beams, critical sections, design shear strength of plain concrete, design of shear reinforcement, bond stress, anchorage development length, bond failure and bond strength, Introduction to torsion in R. C. C. beams, General behaviour in torsion, design of sections subjected to torsion, shear flexure.

Section C

Design of Slabs: Introduction to flat slabs. One-way two-way slabs. Design of slab sections using IS method.

Design of Continuous Beams Slabs: Analysis of continuous systems General guidelines and Codal provisions design detailed drawings of continuous beams slabs.

Section D

Design of Columns: Classification effective length of columns, codal requirements, analysis design of sections subjected to axial loading axial loading combined with bending moment.

Design of Isolated Footings: Types of footings, soil pressure under footings, General design considerations Codal provisions. Design of isolated, square, rectangular circular footings. Design of footings subjected to eccentric loads.

Staircases: Types of staircases, loads on stairs, Design of different types of staircases.

References:

1. Pillai, U. and Menon, D., "Reinforced Concrete Design" Tata McGraw Hill, New Delhi (*2003*).
2. Jain, A.K., "Limit State Design of R. C. C. Structures" Nem Ch and Sons, Roorkee (*2002*).
3. Varghese, "Limit State Design of Reinforced Concrete" Prentice Hall of India, New Delhi (*2003*).
4. Dayaratnam, P., "Design of Reinforced Concrete" Oxford and IBH Publishers, New Delhi (*2002*).
5. Chra, R., "Limit State Design of Reinforced Concrete" Stard Book House, New Delhi (*2002*).

(Department Elective–III)
CEL 386: GROUND IMPROVEMENT TECHNIQUES

L	T	P
3	0	0

Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: The mechanics of soil stabilization, principles techniques.

Shallow Stabilization with Additives: Lime, flyash, cement other chemicals bitumen.

Section B

Deep Stabilization: Stone column, prefabricated drains, electro-osmosis, lime column. soil-lime column. Grouting: permeation, compaction jet. Vibro-floatation, dynamic compaction, thermal, freezing. Dewatering systems.

Section C

Geosynthetics Reinforced Soil Structures: Different types of Geosynthetics-Geotextiles (woven and non-woven), geogrids, geomembranes etc. and their functions, Reinforced Earth and Soil nailing, principles of soil reinforcement.

Section D

Design of Geosynthetics Reinforced Soil Structures: Design construction of geosynthetic reinforced soil retaining structures – walls slopes; Codal provisions; bearing capacity improvement; embankments on soft soils; Case studies.

References:

1. Swami, S., “Reinforced Soil its Engineering Applications” I K International, (*2006*).
2. Shukla, S. K. and Yin, J. H., “Fundamentals of Geosynthetics Engineering” Taylor Francis, (*2006*).
3. Koerner, R. M., “Designing with Geosynthetics” Prentice-Hall, N.J., U. S. A, (*2005*).
4. Rao, V. G. and Raju, N. S., “Engineering with Geosynthetics” Tata McGraw Hill Publications Co. Ltd. New Delhi, (*1999*).
5. Shukla, S. K., (Edited) “Geosynthetics their Applications” Thomson Telford, (*2002*).

(Department Elective–III)
CEL 387: PAVEMENT DESIGN

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Types of pavement structure. Functions of pavement components, factors affecting pavement design, design wheel load, strength characteristics of pavement materials. Comparison of flexible rigid pavements.

Design of Flexible Pavements: General design considerations, methods for design of flexible pavements – group index method, triaxial test method, Hveem stabile meter method, McLeod's method, Indian Roads congress method.

Section B

Design of Bituminous Mixes: Mix design approaches, Marshall method of bituminous mix design, super pavement

Section C

Design of Rigid Pavements: General design considerations, Westergard's analysis, methods for design of rigid pavements - PCA method, AASHTO method, Indian Roads Congress method, types design of joints in cement concrete pavements.

Section D

Modern Design Concepts: Reinforced concrete pavement, airport pavement design, bituminous pavement with cemented base, interlocking concrete block pavement, full depth bituminous pavement, ultrathin white topping, perpetual pavement, pavement overlays.

References:

1. Yoder, E. J. and M. W. Witczak, “Principals of Pavement Design”, Wiley Publication.
2. Khanna, S. K. and C. E. G. Justo, “Highway Engineering”, Nem Ch and Bros., Roorkee.
3. Sharma, S. K., “Principles, Practice Design of Highway Engineering”, S. Ch and Co.
4. Chakraborty, P. and A. Das, “Principles of Transportation Engineering”, Prentice Hall India.
5. Yang, H. H, “Pavement Analysis Design”, Prentice Hall.

****Note: Use of IRC: 37-2012 IRC: 58-2011 shall be allowed in the examination. ****

(Department Elective–III)
CEL 388: FINITE ELEMENTS METHOD

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Background applications, general description of the method, summary of the analysis procedure, matrix theory, differential equations.

Review of Solid mechanics: Equations of equilibrium, stresses strains, strain displacement relations, linear constitutive relations, two – dimensional elasticity, non-linear material behaviour, material characterization.

Section B

One – Dimensional Finite Elements: The concept of an element, various element shapes, displacement models, finite element modelling, coordinates shape functions, stiffness matrix, the finite element equations treatment of boundary conditions.

Two-Dimensional Finite Elements: Introduction, two-dimensional boundary value problems, various element shapes, constant strain triangular elements, quadrilateral elements, natural coordinates, connectivity nodal coordinates, problem modelling boundary conditions.

Section C

Two-Dimensional Isoperimetric Elements: Introduction, the four-nodded quadrilateral element, numerical integration, interpolation formulas shape function formulas, computations of element stiffness matrix

Section D

Beams Frames: Introduction, finite element formulation, load vector, boundary conditions, displacement method for beam analysis, beam finite elements, shear force bending moment, plane frames.

References:

1. Desai, C. S. and Abel, J. F., “Introduction to The Finite Element Method” CBS Publishers Distributions, Delhi, (*2004*).
2. Buchanan, G. R., “Schaum’s Outline Series, Theory Problems of Finite Element Analysis” McGraw Hill International Edition/Tata McGraw Hill, New Delhi, (*2004*).
3. Chrupta, T. R. Belegundu, A. D., “Introduction to Finite Elements in Engineering” PHI, New Delhi, (*1997*).
4. Krishnamoorthy, C. S., “Finite Element Analysis – Theory Programming” TMH Publishing Co. Ltd. New Delhi, (*2002*).
5. Bathe, K. J., “Finite Element Procedures” Prentice Hall of India, New Delhi, (*1997*).

CEP 381: HIGHWAYS ENGINEERING LABORATORY

L	T	P
0	0	1

Total Marks: 100

List of experiments

1. Aggregate crushing value test.
2. Aggregate attrition test.
3. Impact value test.
4. Abrasion test (Dorry's Los Angeles)
5. Soundness test.
6. Flakiness test.
7. Water absorption specific gravity test.
8. Laboratory C. B. R. test.
9. North Dakota cone test.
10. Penetration test on bitumen.
11. Softening point test for bitumen.
12. Ductility test.
13. Specific gravity Test.
14. Viscosity test.
15. Flash point fire point test.
16. Marshall Stability test.

CEP 384: ENVIRONMENTAL ENGINEERING LABORATORY

Total Marks: 100

L	T	P
0	0	1

List of Experiments

1. Determination of total solids, suspended solids, dissolved volatile and fixed residue in a sewage/water sample.
2. Determination of turbidity.
3. Estimation of the pH-Value.
4. Determination of the carbonate, bicarbonate hydroxide alkalinity.
5. Determination of the type extend of acidity.
6. Estimation of the hardness of water (EDTA Method).
7. Estimation of the chloride concentration.
8. Determination of the dissolved oxygen percentage saturation.
9. Determination of biochemical oxygen demand (BOD) of wastewater.
10. Estimation of chemical oxygen demand (COD).

CEL 451: DESIGN OF CONCRETE STRUCTURE-II

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

R. C. C. Footings: Design of combined footings (Trapezoidal and rectangular) Design of Strap footing and raft foundations. Design of piles and pile footings.

Section B

Beams curved in plan: Design of semicircular beams supported on three supports. Design of circular beam supported on symmetrically placed columns.

Section C

Domes: Introduction to different types of domes and shells. Design of spherical and conical domes. Design of cylindrical shells supported on edge beams.

Section D

Retaining Walls: Design of cantilever and counter fort retaining walls. Design of basement walls.

Water Tanks: Introduction, Design of tanks resting on ground, underground tanks and elevated tanks.

References:

1. Raju N K, “Advanced Design of Structures” Tata McGraw Hill, New Delhi, 2000.
2. Varghese P C, “Advanced Reinforced Concrete Design” Prentice Hall of India, New Delhi, 2001.
3. Dayaratnam, P,” Advanced Design of Concrete Structures” Oxford and IBH Publishing Co, Pvt. Ltd., New Delhi, 2002.
4. Syal I C, “Behavior, Analysis and Design of Reinforced Concrete structural Elements” S. Chand & company, New Delhi, 2003.
5. MacGregor J G,”Reinforced Concrete- Mechanics and Design”, Prentice Hall, N.J., New York, 1997.

CEL 452: DESIGN OF STEEL STRUCTURES-II

Total Marks: 100

L	T	P
3	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Design of Round Tubular Structures: Introduction, round tubular sections, permissible stresses, tube columns and compression members, tube tension members, tubular roof trusses, Design of tubular beams, Design of tubular purlins.

Section B

Design of steel foot bridge: Introduction, design of flooring, cross girders, analysis of N- type truss, design of various members of truss, design of joints, design of bearings.

Section C

Design of complete industrial building with design of:

a) Gantry Girder
b) Column bracket.
c) Mill bent with constant moment of inertia

Lateral and longitudinal bracing for column bent etc

Section D

Design of a single track through type Railway Bridge with lattice girders having parallel chords (for B. G):

Design of stringer and stringer bracing

Design of cross girders

Design of connection between stringer and cross girder

Design of main girders – various members and their joints

Design of bottom lateral bracing and top lateral bracing

Design of portal bracing and sway bracing

Design of bearings – rocker and rollers

References:

1. Arya A S and Ajmani J L, “Design of Steel Structures” Nem Chand & Bros, Roorkee,1996.
2. Chandra R, “Design of Steel Structures” Vol. I & II Standard Book House, Delhi,1991
3. Raz S A, “Structural Design in Steel” New Age International (P) Ltd., New Delhi, 2002
4. Raghupathi M, “Design of Steel Structures” Tata McGraw-Hill Publishing Company ltd., New Delhi, 1999.
5. Dayaratnam P, “Design of Steel Structures” Wheeler Publishers, New Delhi, 2000.

CEL 453: WATER RESOURCES ENGINEERING-II

	L	T	P
Total Marks: 100	**2**	**1**	**0**

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Head Works: Types of head works, Functions and investigations of a diversion head work: component parts of a diversion head work and their design considerations, silt control devices.

Theories of Seepage: Seepage force and exit gradient, assumptions and salient features of Bligh's Creep theory, Limitations of Bligh's Creep theory, salient features of Lane's weighted Creep theory and Khosla's theory, Comparison of Bligh's Creep theory and Khosla's theory, Determination of uplift pressures and floor thickness.

Section B

Design of Weirs: Weirs versus barrage, types of weirs, main components of weir, causes of failure of weir and design considerations with respect to surface flow, hydraulic jump and seepage flow. Design of barrage or weir.

Energy Dissipation Devices: Use of hydraulic jump in energy dissipation, Factors affecting design, Types of energy dissipators and their hydraulic design.

Section C

Canal Regulators: Offtake alignment, cross-regulators – their functions and design, Distributory head regulators, their design, canal escape.

Canal Falls: Necessity and location, types of falls and their description, selection of type of falls, Principles of design, Design of Sarda type, straight glacis and Inglis or baffle wall falls.

Section D

Cross-Drainage works: Definitions, choice of type, Hydraulic design consideration, Aqueducts their types and design, siphon aqueducts – their types and design considerations, super passages, canal siphons and level crossing.

Canal Out-lets: Essential requirements, classifications, criteria for outlet behaviours, flexibility, proportionality, sensitivity, sensitiveness, etc. Details and design of nonmodular, semi-modular and modular outlets

References:

1. Irrigation Engg. & Hydraulic Structure by Santosh Kumar Garg, Khanna Publishers
2. Design of Irrigation Structures by R.K. Sharma, Oxford IBH Pub
3. Irrigation Engg. and Hydraulics Structures by S.R. Sahasrabudhe, . Katson Publishing
4. Irrigation Practice and Design Vol. I to VII by K.B. Khushlani. Oxford IBH Pub
5. P.N. Modi; Irrigation with Resources and with Power Engineering, Standard Book House
6. Irrigation Engg. Vol. I & II by Ivan E. Houk, John Wiley and sons

CEL 454: FOUNDATION ENGINEERING

Total Marks: 100

L	T	P
2	1	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Earth Pressure: Lateral earth pressure theory, Different types of earth pressures, Rankine's active and passive earth pressures, Coulomb's theory for lateral earth pressure. Culmann's and Rebhann's graphical construction, Sheet pile walls and braced cuts.

Soil Investigation: Object of soil investigation for new existing structures. Depth of exploration for different structures. Spacing of bore holes. Methods of soil exploration relative merits and demerits, preparation of borehole logs, geophysical exploration techniques.

Section B

Shallow Foundation: Types of shallow foundations, definitions Terzaghi's analysis. Types of failures. Factors affecting bearing capacity. Skempton's equation. B. I. S. recommendations for shape, depth inclination factors. Plate load test, standard penetration test, Contact pressure distribution. Causes of settlement of structures comparison of immediate consolidation settlement Calculation of settlement by plate load test. Static cone penetration test data. Allowable settlement of various structures according to IS Code. Situation most suitable for provision of rafts. Proportioning of rafts in s clays. Various methods of designing raft, floating foundation.

Section C

Pile Foundation: Necessity uses of piles, classification of piles. Merits demerits of different types based on composition. Types of pile driving hammers and their comparison. Effect of pile driving on adjacent ground. Use of Engineering News formula Hiley's formula for determination of allowable load. Pile Load Test, separation of skin friction point resistance using cyclic pile load test data related numerical problems. determination of point resistance frictional resistance of a single pile by static formula. Piles in clay, safe load on a friction point bearing pile. Pile in s spacing of piles in a group, factors affecting capacity of a pile group. Efficiency of pile group bearing capacity of a pile group in clay. Settlement of pile groups in clay Negative skin friction.

Stability of Slopes: Necessity, causes of failure of slopes. Stability analysis of infinite and finite slopes, Taylor's stability number- its utility.

Section D

Caissons and Wells: Major area of use of caissons Advantages disadvantages of open box pneumatic caissons. Essential part of a pneumatic caisson. Components of a well. Calculation of allowable bearing pressure, conditions for stability of a well ,Forces acting on a well foundation. Computation of scour depth Tilts and Shifts.

Machine Foundations: Theory of vibrations, foundations subjected to vibrations, determination of dynamic properties of soil, Dynamic analysis of block foundations.

References:

1. Peck, R. B., Hanson, W. B. Thorn, T. H., "Foundation Engineering" Jonh Wiley Sons Inc, New York. (*1974*).
2. Das, B. M., "Principles of Foundation Engineering" Thomson Asia Pte Ltd, Singapore, (*2003*).
3. Bowles, J. E., "Foundation Analysis Design" McGraw Hill, New York, (*1988*).
4. Ranjan, G., Rao A. S.R, "Basic Applied Soil Mechanics" New Age International, New Delhi, (*2000*).
5. Murthy, V. N.S., "Principles of Soil Mechanics of Foundation Engineering" UBSPD, (*2001*).

(Department Elective–IV)
CEL 455: ELEMENTS OF REMOTE SENSING GIS

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction to Geographic Information System: Definitions related terminology, evolution of GIS, components of GIS, approaches to the study of GIS.

Maps GIS: Introduction, map scale classes of maps, the mapping process, plane coordinate systems transformations, geographic coordinate system of earth, map projection, geo referencing topographic mapping.

Section B

Digital Representation of Geographic Date: Introduction, database management systems, raster geographic date representation, vector data representation, data representation data analysis in GIS.

Section C

Raster Basic GIS Data Processing: Introduction, acquiring hling raster geographic data, raster based GIS data analysis, cartographic modelling.

Vector Based GIS Data Processing: Introduction, Characteristics of vector based GIS data processing, topological non-topological functions.

Section D

Remote Sensing GIS: Introduction, Principles of electromagnetic remote sensing, remote sensing system classifications, imaging characteristics, extraction of metric information from remotely sensed images, integration of remote sensing GIS.

References:

1. Lo, C. P. Young, K. W., “Concepts Techniques of Geographic Information Systems” PHI Pvt. Ltd, New Delhi, (*2002*).
2. Campbell, J. B., “Introduction to Remote Sensing” CBS Publishers and Distributors, New Delhi, (*2003*).
3. Burrough, P. A., “Principles of Geographic Information Systems for L Resources Assessment” Oxford University Press, (*2003*).
4. Duggal, S. K., “Surveying Volume 2” Tata McGraw Hill, New Delhi, (*2004*).
5. Donnay, J. P., “Remote Sensing Urban Analysis” CBS Publishers and Distributors, New Delhi, (*2003*).

(Department Elective–IV)

CEL 456: ENGINEERING GEOLOGY ROCK MECHANICS

	L	T	P
Total Marks: 100	**3**	**0**	**0**

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

General Geology: Importance of engineering Geology applied to Civil Engineering practices. Weathering, definition, types effect. Geological works of rivers, wind, glaciers as agents of erosion, transportation deposition.

Rocks Minerals: Minerals, their identification, igneous, sedimentary and metamorphic rocks. Classification of rocks for engineering purposes. Rock quality designation (RQD).

Section B

Structural Geology: Brief idea about stratification, apparent dip, true dip, strike in conformities. Folds, faults joints: definition, classification relation to engineering operations.

Engineering Geology: Geological considerations in the engineering. Projects like tunnels, highways, foundation, dams, reservoirs. Earthquake: Definition, terminology, earthquake waves, intensity, recording of earthquake.

Section C

Engineering Properties of Rocks Laboratory Measurement: Uniaxial compression test, tensile tests, permeability test, shear tests, size shape of specimen rate of testing. Confining pressure, stress strain curves of typical rocks. Strength of intact fissured rocks, effect of anisotropy, effect of saturation temperature

Section D

In-situ Determination of Engineering Properties of Rock Masses: Necessity of in-situ tests, uniaxial load tests in tunnels open excavations, cable tests, flat jack test, shear test, pressure tunnel test. Simple methods of determining in situ stresses, bore hole test.

Improvement in Properties of Rock Masses: Pressure grouting for dams tunnels, rock reinforcement rock bolting.

Text / References:

1. Goodman, R.E., “Introduction to Rock Mechanics”.
2. Farmar, I.W., “Engineering Behaviour of Rocks”.
3. Jaager Cook, “Fundamentals of Rock Mechanics”.
4. Arora, D.S., “Engineering Geology”.
5. Singh, P., “Engineering Geology”.
6. Verma, B.P. “Rock Mechanics for Engineering”.
7. C, Jaager, “Rock Mechanics Engg”.

(Department Elective–IV)
CEL 458: TOWN PLANNING

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Town Planning: Definition meaning, age of planning, scope motives of planning, brief history of town planning – its origin growth, historically development of town planning in ancient valley civilizations. Indus Nile Tigris Euphrates, Greek Roman, Medieval Renaissance town planning

Section B

New Concepts: Garden city movement, Linear city concentric city concepts, Neighborhood Radburm, La-cite industrial, Radiant city to present day planning.

Section C

Planning Principles: Types of town their functions, types of town planning – Grid Iron, Radial, Spider webs, Irregular mixed, their advantages disadvantages.

Section D

Planning Practice Techniques: Zoning – its definition, procedure districts, height bulk zoning, F. A. R., Master Plan – Meaning, preparation realization, the scope of city planning – city rehabilitation slum clearance.

Books:

1. Cherry Gordon, “Urban Planning Problems” Board Hill, London, (*1974*).
2. Sundaram, K.V., “Urban Regional Planning in India” Vikas Publishing House (P) Ltd., New Delhi, (*2000*).
3. Gallion, A. B, Eisner S, “The Urban Pattern” Van Nostr Reinhold, New York, (*1993*).
4. Jon, Lang, “A Concise History of Modern Architecture in India” Permanent Black Publishers, New York, (*1998).*
5. Taurus, Parke, “A City with Views Florence” I.B. Taurus Publishers, New York, (*1994).*

(Department Elective–V)
CEL 459: BRIDGE ENGINEERING

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Definition, components of a bridge, classifications, importance of bridge Investigation of Bridges: Need for investigations, selection of bridge site, preliminary data to be collected, design discharge and its determination, linear waterway, economical span, vertical clearance above HFL, scour depth, choice of bridge type.

Standard Specifications: For road bridges, I.R.C. loadings, code provisions on width of carriage way, clearances, loads considered etc. Standard specifications for railway bridges, Railway bridge code.

Section B

Reinforced Concrete Bridges: Slab culverts, T-beam Bridge, Courbon's theory for load distribution, Balanced cantilever bridges, illustrative examples, pre-stressed concrete bridges, (General discussions).

Section C

Sub Structure: Types of piers and abutments, design forces, design of piers and abutments.

Section D

Bearing and Joints: Various types of expansion bearing and fixed bearings, elastomeric bearings, joints and their types. Introduction to construction, inspection and maintenance of bridges.

References:

1. Victor D J, “Essentials of Bridge Engineering” Oxford and IBH Publishers, New Delhi, 2003.
2. Ratwani V and Aswani M G, “Design of Concrete Bridges, Khanna Publishers, New Delhi, 1986.
3. Bindra S P, “Principles and Practice of Bridge Engineering” Dhanpat Rai & Sons, New Delhi, 1999.
4. Ponnuswamy S,” Bridge Engineering” Tata McGraw Hill, New Delhi, 2003.
5. Punmia B C , Jain A K ,”RCC Designs” Laxmi Pub.(P) Ltd.,2003

(Department Elective–V)

CEL 460: ELEMENTS OF EARTHQUAKE ENGINEERING

	L	T	P
Total Marks: 100	**3**	**0**	**0**

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Un-damped free vibrations of single degree of freedom systems: Introduction, definitions, characteristics of a dynamic problem, degrees of freedom, Newton's law of motion, De Alembert's Principal, free body diagram, derivations of differential equation of motion, solution of differential equation of motion, equivalent stiffness of spring combinations, springs in series, springs in parallel.

Section B

Damped free vibrations of single degree of freedom systems: Introduction, types of damping, free vibrations with viscous damping, over-damped, critically- damped and under- damped systems, logarithmic decrement, structural damping.

Section C

Earthquake Resistant Design Philosophy: Introduction, criteria for earthquake resistant design, principles of reliable seismic behavior, structural forms for earthquake resistance, earthquake forces versus other forces.

Lateral Load Analysis: Idealization of structures and selection of analysis, equivalent lateral force concepts, response spectrum analysis, seismic forces as per IS: 1893 – 1984 and IS : 1893 – 2002.

Section D

Behavior and Design of Concrete Structures: Characteristics of concrete and reinforcing steel, influence of bond and anchorage and confinement of concrete, Seismic design and detailing of reinforced concrete and masonry buildings (IS 13920; IS 13827: IS 13828; IS 4326) and flexural strength and ductility of RC members.

References:

1. Paz M, “Structural Dynamics – Theory and Computation” CBS Publishers and Disributors, New Delhi, 2003.
2. Chopra A K, “Structural Dynamics” John Wiley & Sons, New Delhi, 2002.
3. Dowrick D J, “Earthquake Resistant Design for Engineers and Architects” John Wiley & Sons, New York, 2000.
4. Paulay and Priestley, “Seismic Design of Reinforced Concrete and Masonry Buildings” John Wiley and sons, New York, 1992.
5. Rao S S,”Mechanical Vibrations” Pearson Education Publishers, 2004.

(Department Elective–V)

CEL 461: PRE- STRESSED CONCRETE DESIGN

Total Marks: 100

L	T	P
3	0	0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage
Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction: Basis concepts, Materials used, advantages of prestressed Concrete, Applications of prestressed concrete.

Materials for prestressed Concrete: High strength concrete, strength requirements permissible stresses in concrete, creep & shrinkage, deformation characteristics, high strength steel, strength requirements, permissible stress in steel.

Section B

Prestressing Systems: Introduction, pretensioning systems, post-tensioning systems, chemical prestressing.

Losses of Prestress: Nature of losses, different types of losses and their assessment.

Analysis of Prestress & Bending Stress: Basic assumptions, Resistant stresses at a section, pressure line, and concept of land balancing, stresses in grading moment.

Section C

Flexural Shear Strength of Prestressed Concrete Sections: Types of flexural failure, strain compatibility method, code procedures, shear and principal stresses, ultimate shear resistance of pressed concrete members, prestressed concrete members in torsion.

Transfers of Prestress in Pre-tensioned and Post-tensioned members:

Transmission Length, bond structures, Transverse tensile stress End-zone reinforcement, stress distribution in end block

Section D

Design Prestressed Concrete Sections: Design of section for flexure, Axial tension compression & bending, shear, bond and torsion.

Design of concrete Pipes & Tanks: Circular prestressing type of prestressed concrete pipes, design of prestressed concrete pipes, Analysis and design of prestressed concrete tanks.

References:

1. Raju N K, “Prestressed Concrete” Tata McGraw Hill, New Delhi, 2001.
2. Rajagopalan N, “Prestressed Concrete” Narosa, New Delhi, 2001.
3. Dayaratnam P, “Prestressed Concrete” Oxford & IBH, New Delhi, 1999.
4. Lin T Y, “Prestressed Concrete” McGraw Hill, New York, 1985.
5. Edward G Nawy, “Prestressed Concrete-A Fundamental Approach” Prentice Hall Publishers, NY, 2000

CEP451: DEPARTMENTAL CAD LABORATORY (RCC)

L	T	P
0	0	1

Total Marks: 100

Structural Drawings of Reinforced Concrete Elements as per CEL451

CEP452: DEPARTMENTAL CAD LABORATORY (Steel)

L	T	P
0	0	1

Total Marks: 100

Structural Drawings

- Detailed working drawings for
- Industrial buildings
- Steel Foot Bridge and Through Type Railway Bridge