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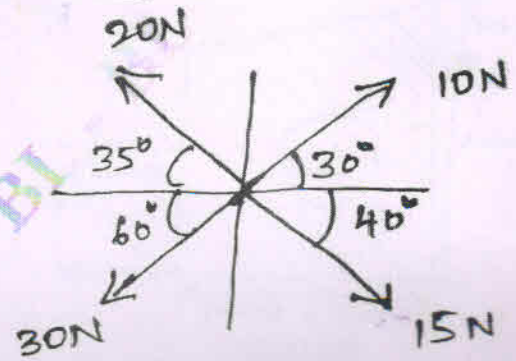
BESCK204A

Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Introduction to Civil Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Briefly explain the following : i) Geotechnical engineering ii) Environmental engineering.	10	L1	CO1
	b.	Write short notes on : i) Structural engineering ii) Transportation engineering.	10	L1	CO1
		OR			
Q.2	a.	Write short notes on : i) Bricks ii) Concrete.	10	L1	CO1
	b.	Briefly explain the following : i) Foundation ii) Beams	10	L1	CO1
		Module – 2			
Q.3	a.	Write a note on : i) Smart city concept ii) Clean city concept.	10	L1	CO2
	b.	Briefly explain the urban air pollution management.	10	L1	CO2
		OR			
Q.4	a.	Write short notes on energy efficient buildings.	10	L1	CO2
	b.	Briefly explain the following : i) Solid waste management ii) Flood control.	10	L1	CO2
		Module – 3			
Q.5	a.	Explain the classification of force systems.	10	L1	CO3
	b.	For the coplanar concurrent force system given below, find the magnitude and direction of the resultant.  Fig.Q5(b)	10	L2	CO3

OR

Q.6	a.	State and explain Varignon's theorem.	10	L1	CO3
	b.	Find the magnitude, direction ad position of the resultant with respect to A for the Fig.Q6(b) shown below.	10	L2	CO3

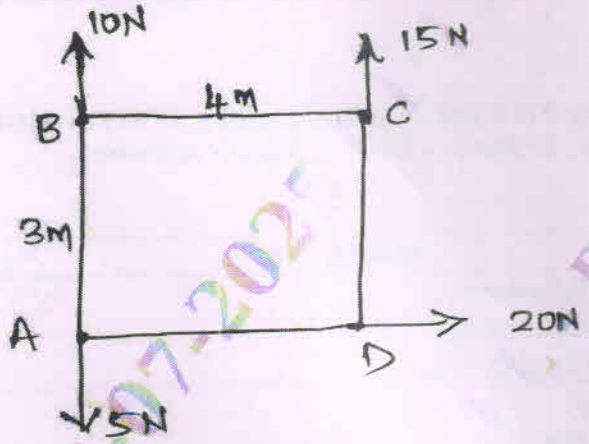


Fig.Q6(b)

Module – 4

Q.7	a.	Locate the centroid of a rectangular lamina using first principles.	10	L1	CO4
	b.	Find the centriod of the shaded area for the Fig.Q7(b) shown below.	10	L3	CO4

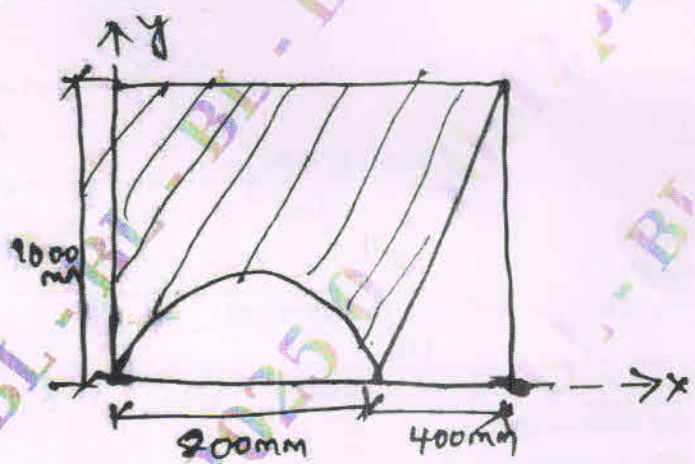


Fig.Q7(b)

OR

	b.	Compute the centroid of the shaded area for the Fig.Q8(b) shown below.	10	L1	CO4

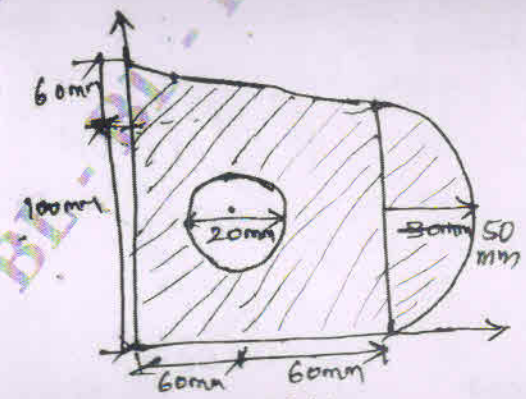


Fig.Q8(b)

Module – 5

Q.9	**a.**	State and prove parallel axis theorem.	**10**	**L2**	**CO5**
	b.	Calculate the moment of inertia of the Fig.Q9(b) shown below.	**10**	**L3**	**CO5**

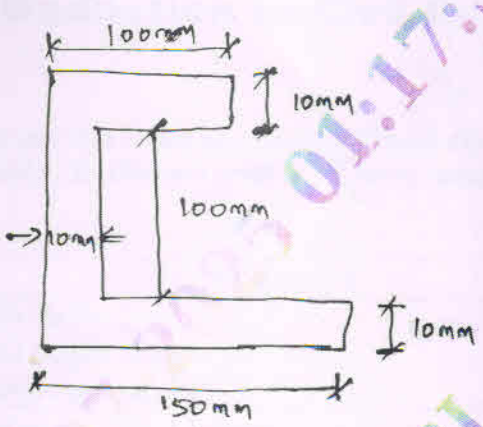


Fig.Q9(b)

OR

Q.10	**a.**	Derive the equation for moment of inertia of a triangular lamina.	**10**	**L2**	**CO5**
	b.	Determine the moment of inertia of the shaded portion about line MN for the Fig.Q10(b) shown below.	**10**	**L3**	**CO5**

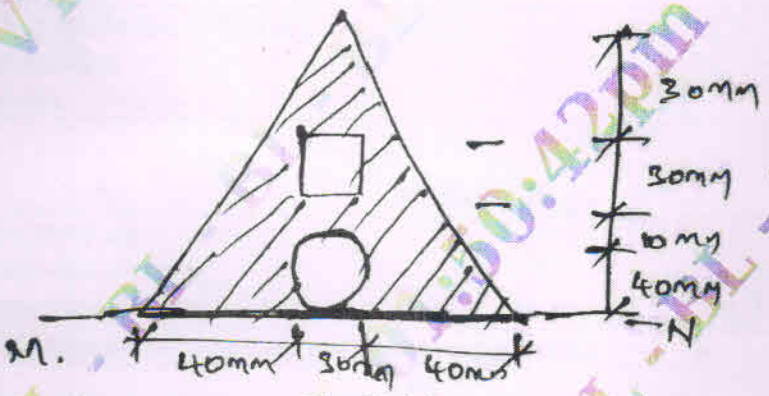


Fig.Q10(b)

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BESCK204B

Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Introduction to Electrical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Enumerate and explain briefly the essential elements of hydro power plant.	06	L2	CO1
	b.	State and explain Kirchhoff's laws.	06	L2	CO2
	c.	A resistance of 5 Ω is connected in series with a parallel combination of 4 Ω and 12 Ω. If the current through 5 Ω resistor is 10 A, find the (i) Currents in 4 Ω and 12 Ω resistors, (ii) Supply voltage and (iii) Power dissipated by each resistor.	08	L3	CO2
		OR			
Q.2	a.	List the advantages and disadvantages of nuclear power plant.	06	L1	CO1
	b.	List the characteristics of parallel circuit. Obtain the expression for current through any resistor in a parallel circuit.	06	L1	CO2
	c.	Two batteries having emfs of 10 V and 7 V, and internal resistances of 2 Ω and 3 Ω respectively, are connected in parallel across a load of resistance 1 Ω. Calculate (i) the current supplied by each battery, (ii) the current through the load, and (iii) the voltage across the load.	08	L3	CO2
		Module – 2			
Q.3	a.	Show that the pure inductance does not dissipate any power. Draw the phasor diagram and the waveforms of voltage and current.	06	L2	CO2
	b.	What are the advantages of three phase system over a single phase system?	06	L1	CO2
	c.	A coil has a resistance of 10 Ω and draws a current of 5 A when connected across a 100 V, 60 Hz source. Determine (i) the inductance of the coil (ii) the power factor of the circuit (iii) the voltage across inductance and (iv) the reactive power.	08	L3	CO2
		OR			
Q.4	a.	Derive an expression for the average power consumed by a R-L series circuit. Draw the phasor diagram and the waveforms of voltage and current.	06	L2	CO2
	b.	A three-phase, delta connected load consumes a power of 120 KW, drawing a lagging line current of 200 A from a three-phase, 400 V, 50 Hz supply. (i) Find the parameters of each phase, (ii) What would be the power consumed if the loads were connected in star?	06	L3	CO2
	c.	A coil of resistance 10 Ω and inductance 0.1 H is connected in series with a 150 μF capacitor across a 200 V, 50 Hz supply. Calculate (i) the impedance, ii) the current, iii) the power factor, iv) the voltage across the coil and the capacitor.	08	L3	CO2

		Module – 3			
Q.5	**a.**	Explain the function of main parts of a dc machine.	**06**	**L2**	**CO3**
	b.	Sketch and explain speed-load characteristics of (i) series motor (ii) shunt motor. Mention two applications of each motor.	**06**	**L2**	**CO3**
	c.	A 4-pole, shunt generator with Lap-connected armature has field and armature resistances of 50 Ω and 0.1 Ω respectively. It supplies power to sixty 100 V, 40 W lamps. Calculate (i) the armature current (ii) the current per armature path, and (iii) the generated emf. Allow a contact drop of 1 V per brush.	**08**	**L3**	**CO3**
		OR			
Q.6	**a.**	Derive the emf equation for a dc generator.	**06**	**L2**	**CO3**
	b.	Explain the different methods used to control the speed of dc series motor.	**08**	**L2**	**CO3**
	c.	A 6 pole, Lap-connected dc series motor, with 864 conductors, takes a current of 110 A at 480 V. The armature and series-field resistance are 0.18 Ω and 0.02 Ω respectively. The flux per pole is 50 mwb. Calculate (i) the speed, and (ii) the gross torque developed by the armature.	**06**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Derive the emf equations of a transformer and hence find the transformation ratio.	**06**	**L2**	**CO4**
	b.	Explain the principle of operation of a 3-phase induction motor and give reason for an induction motor cannot run at synchronous speed.	**06**	**L2**	**CO4**
	c.	A 600 KVA, single phase transformer has an efficiency of 92% both at full load and half full load, upf. Determine its efficiency at 75% full load, 0.9 pf.	**08**	**L3**	**CO4**
		OR			
Q.8	**a.**	Define slip. Derive an expression for frequency of rotor current. In what way, an induction motor is similar to a transformer?	**06**	**L2**	**CO4**
	b.	Explain the various losses that occur in a transformer. Also derive the condition for maximum efficiency of a transformer.	**08**	**L2**	**CO4**
	c.	A 4-pole, 3-phase, 50 Hz induction motor runs at a speed of 1470 rpm. Find (i) the synchronous speed (ii) the slip and (iii) the frequency of the induced emf in the rotor.	**06**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	With relevant circuit diagrams and switching tables, explain two-way and three-way control of a lamp. Mention its applications.	**08**	**L2**	**CO5**
	b.	Write a short note on Fuse and MCB.	**06**	**L2**	**CO5**
			06	**L2**	**CO5**

Q.10	**a.**				
	b.	What is electric shock? What are the precautions to be taken to prevent electric shock?	**06**	**L1**	**CO5**
	c.	Define "unit" used for consumption of electrical energy and explain two-part tariff. Mention its advantages and disadvantages.	**08**	**L2**	**CO5**

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BESCK204C

Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Introduction to Electronics and Communication

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	With a neat diagram, explain the working of a DC power supply. Also mention the principal components used in each block.	10	L2	CO1
	b.	With circuit diagram and waveform explain the working of full wave rectifier.	10	L2	CO1
		OR			
Q.2	a.	List and describe the main types of amplifiers.	7	L2	CO1
	b.	With circuit diagram explain the following voltage doubler, voltage Tripler.	6	L3	CO1
	c.	Mention the advantage of negative feedback in amplifier circuit with relevant equations and diagram. Explain the concept of negative feedback.	7	L2	CO1
		Module – 2			
Q.3	a.	List and explain the conditions to obtain sustained oscillations. Determine the frequency of oscillations of a 3 stage ladder network in which C = 10 ηF and R = 10 KΩ.	10	L3	CO2
	b.	With circuit diagram and waveform show how operational amplifier can work as a comparator and voltage follower.	10	L3	CO2
		OR			
Q.4	a.	With neat circuit diagram explain the working of Wein Bridge oscillator.	10	L2	CO2
	b.	Sketch the circuit of each of the following based on the use of operational amplifier. i) Inverting amplifier ii) Differentiator	10	L2	CO2
		Module – 3			
Q.5	a.	Explain with circuit diagram of full adder.	6	L2	CO3
	b.	Given the two binary numbers X = 1010100 and Y = 1000011 perform the subtraction i) X – Y ii) Y – X using 2's complement.	6	L3	CO3
	c.	Convert the following number from the given base to the other bases identified : i) Decimal 225 to binary ii) Binary 11010111 to octal iii) Octal 623 to decimal iv) Hexadecimal 2AC5 to decimal.	8	L2	CO3
		OR			
Q.6	a.	Express the Boolean function $F_1 = A + B'C$ in a sum of minterms form and $F_2 = XY + X'Z$ in a product of maxterms form.	10	L3	CO3
	b.	Design a full adder using two half address and on OR gate.	10	L3	CO3

Module – 4

Q.7	**a.**	Compare embedded systems and general computing systems and also provide major application areas of embedded system.	10	L2	CO4
	b.	Bring out the differennce between RISC and CISC, microprocessor and microcontrollers.	10	L2	CO4

OR

Q.8	**a.**	Draw the basic block diagram of instrumentation and control system. Also explain feedback based control system.	10	L2	CO4
	b.	With neat diagram explain the working of LED and 7 segment display.	10	L2	CO4

Module – 5

Q.9	**a.**	With neat diagram explain the basic blocks used in communication system.	10	L2	CO5
	b.	Explain the need for modulation and explain briefly the types of modulations used for communication.	10	L2	CO5

OR

Q.10	**a.**	What are the advantages and disadvantages of digital communication over analog communication?	10	L2	CO5
	b.	With neat diagram explain the working of time division multiplexing and frequency division multiplexing.	10	L2	CO5

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BESCK204D

Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Introduction to Mechanical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain briefly the emerging trends of Mechanical engineering in manufacturing and energy sector.	10	L2	CO1
	b.	Write a note on : i) Global warming ii) Ozone layer depletion.	10	L2	CO1
		OR			
Q.2	a.	Explain the working of hydel power plant with a neat sketch.	10	L2	CO1
	b.	Explain with neat sketch, construction and working of a nuclear power plant.	10	L2	CO1
		Module – 2			
Q.3	a.	Explain the working principle of Drilling Machine.	04	L2	CO2
	b.	Illustrate the following operations of milling with sketches: i) Plain milling ii) Slot milling	08	L3	CO2
	c.	With a neat sketch, explain the following operations performed on lathe machine: i) Turning ii) Facing	08	L2	CO2
		OR			
Q.4	a.	Describe the various components of CNC with schematic diagram.	10	L2	CO2
	b.	Define 3D printing. List the various steps involved in the 3D printing.	06	L2	CO2
	c.	List the advantages and applications of CNC.	04	L1	CO2
		Module – 3			
Q.5	a.	Analyze the working of the 4 stroke diesel engine with sketches. Plot the PV diagram.	12	L3	CO3
	b.	List the differences between 4 stroke petrol and diesel engine.	08	L1	CO3
		OR			
Q.6	a.	Describe electric vehicles. Explain the components and working of electric vehicles.	08	L2	CO3
	b.	Describe Hybrid Vehicles. Explain the components of Hybrid vehicles.	08	L2	CO3
	c.	List the advantages and limitations of electric vehicles.	04	L1	CO3

		Module – 4			
Q.7	**a.**	Define engineering material. Briefly explain the classification of ferrous and non ferrous metals.	10	L2	CO4
	b.	Describe the following materials: i) Ceramics ii) Shape memory alloys iii) Glass iv) Diamond	10	L2	CO4
		OR			
Q.8	**a.**	List the differences between soldering, brazing and welding.	10	L1	CO4
	b.	Describe the construction and working of gas welding process with neat sketch.	10	L2	CO4
		Module – 5			
Q.9	**a.**	Enumerate the differences between open loop and closed loop systems.	06	L1	CO5
	b.	Based on the configuration explain different types of robots with sketches.	10	L2	CO5
	c.	Explain the physical design of IoT.	04	L2	CO5
		OR			
Q.10	**a.**	Define automation. Explain the three types of automation.	10	L2	CO5
	b.	Define IoT. List the characteristics of IoT.	10	L1	CO5

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BETCK205B

Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Green Buildings

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	List and explain different types of cost effective building materials.	10	L2	CO1
	b.	Explain the various environmental issues caused due to quarrying of buildings materials.	10	L2	CO1
		OR			
Q.2	a.	Differentiate between burnt red brick and concrete block as masonry materials.	10	L2	CO1
	b.	Write short notes on recycling of brick as a building material.	10	L2	CO1
		Module – 2			
Q.3	a.	With a neat sketch explain Flemish bond in walls.	10	L2	CO2
	b.	Explain the construction method involved in rat trap bond with neat sketch.	10	L2	CO2
		OR			
Q.4	a.	Briefly explain the contribution of Nirmithi Kendra for cost effective technology development.	10	L2	CO2
	b.	Write a short note on alternative roofing system.	10	L2	CO2
		Module – 3			
Q.5	a.	Mention the causes and effects of Global Warming.	10	L2	CO3
	b.	What are the global efforts to reduce carbon emission through green buildings?	10	L2	CO3
		OR			
Q.6	a.	How buildings are contributing towards Global Warming.	10	L2	CO3
	b.	Differentiate between Green buildings and conventional buildings.	10	L2	CO3
		Module – 4			
Q.7	a.	Explain the criteria for a building rated as per GRIHA.	10	L2	CO4
	b.	Explain the characteristics of sustainable building in Green building design.	10	L2	CO4
		OR			
Q.8	a.	Briefly explain the LEED assessment category.	10	L2	CO4
	b.	Briefly explain BREEAM rating system along with its benefits.	10	L2	CO4
		Module – 5			
Q.9	a.	Explain the concept of solar passive heating in buildings.	10	L2	CO5
	b.	Briefly describe the concepts of green composites.	10	L2	CO5
		OR			
Q.10	a.	Describe the process of management of solid waste.	10	L2	CO5
	b.	Write a short note on management of sewage water.	10	L2	CO5

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BETCK205E

Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Renewable Energy Sources

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the availability of renewable sources in India and social implication of renewable energy.	10	L2	CO1
	b.	Briefly explain oil shale and internet of energy.	10	L2	CO1
		OR			
Q.2	a.	Briefly describe OTEC and geothermal energy.	10	L2	CO1
	b.	Briefly describe tidal energy and biomass energy.	10	L2	CO1
		Module – 2			
Q.3	a.	With a neat sketch explain sunshine recorder and flat plate collector.	10	L2	CO2
	b.	Explain photo voltaic cell and its application.	10	L2	CO2
		OR			
Q.4	a.	Explain with a neat sketch the device used to measure direct beam and global beam.	10	L2	CO2
	b.	Explain solar pond electric power plant along with its advantages and disadvantages.	10	L2	CO2
		Module – 3			
Q.5	a.	Briefly explain the availability of wind in India and its major problems associated with wind power.	10	L2	CO3
	b.	Explain with a neat sketch Savonius and Darrieus types of wind turbine.	10	L2	CO3
		OR			
Q.6	a.	Explain with a neat sketch urban to waste energy conversion.	8	L2	CO3
	b.	Explain photosyntehsis process.	6	L2	CO3
	c.	Sketch and label fixed dome biomass conversion.	6	L2	CO3
		Module – 4			
Q.7	a.	Explain with a neat sketch single basin tidal power generation.	10	L2	CO3
	b.	Explain harnessing tidal energy and list the advantages and disadvantages of tidal power generation.	10	L2	CO3
		OR			
Q.8	a.	Explain about OTEC power stations in the world and their problems.	10	L2	CO4
	b.	With neat sketch explain working principle of open cycle OTEC along with its advantages and disadvantages.	10	L2	CO4
		Module – 5			
Q.9	a.	Discuss the benefits of hydrogen energy and problems associates with hydrogen energy.	10	L2	CO5
	b.	Explain with sketch electrolysis hydrogen production technology.	10	L2	CO5
		OR			
Q.10	a.	Discuss about hydrogen energy storage.	10	L2	CO5
	b.	With a neat sketch explain Fuel cell.	10	L2	CO5

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BETCK205I

Second Semester B.E/B.Tech. Degree Examination, June/July 2025

Introductions to Cyber Security

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
1	a.	Who are cyber criminals? Discuss the three group of cyber criminals.	10	L2	CO1
	b.	List the various cyber crimes. Explain the cybercrime against organization and against individual.	10	L1	CO1
		OR			
2	a.	Discuss cyber crime and the Indian ITA 2000.	6	L2	CO1
	b.	Explain cyber defamation.	6	L2	CO1
	c.	Explain Spamming , Forgery, Data diddling salami attack/salami technique.	8	L2	CO1
		Module – 2			
3	a.	Define cyber stalking. Explain types of stalkers.	6	L2	CO2
	b.	Explain Botnets in detail.	7	L2	CO2
	c.	Explain how stalking works?	7	L2	CO2
		OR			
4	a.	How criminals plan the attacks? Explain phases involved in planning cyber crime.	10	L1	CO2
	b.	What is social engineering? Discuss Human Based and Computer Based social engineering.	10	L1	CO2
		Module – 3			
5	a.	Explain password cracking.	6	L2	CO3
	b.	Explain strong, weak and random passwords.	6	L2	CO3
	c.	Explain key loggers and spywares.	8	L2	CO3
		OR			
6	a.	Explain types of viruses.	7	L2	CO2
	b.	Explain back doors.	6	L2	CO2
	c.	Explain types or levels of DoS attacks and discuss tools used to launch DoS attack.	7	L2	CO3
		Module – 4			
7	a.	Explain method of phishing.	8	L2	CO4
	b.	Explain phishing techniques.	6	L2	CO4
	c.	Explain types of phishing scams.	6	L2	CO4
		OR			
8	a.	Explain phishing counter measures.	10	L2	CO4
	b.	List and explain types of identity theft.	10	L2	CO4
		Module – 5			
9	a.	Explain the digital forensics process.	6	L2	CO5
	b.	Explain phases in computer forensics/digital forensics.	7	L2	CO5
	c.	Explain RFC 2822.	7	L2	CO5
		OR			
10	a.	Explain Network forensics.	6	L2	CO5
	b.	Explain the need for computer forensics.	6	L2	CO5
	c.	Explain forensics analysis of E-mail.	8	L2	CO5

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BETCK205H

Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Introduction to Internet of Things (IoT)

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

			M	L	C
		Module – 1			
Q.1	a.	What is IoT? Write the characteristics of IoT system.	06	L1	CO1
	b.	Explain four broad categories of network based on reachability.	06	L2	CO1
	c.	Explain OSI model with the help of neat diagram.	08	L2	CO1
		OR			
Q.2	a.	With a neat diagram explain the evolution of IoT.	08	L2	CO1
	b.	Differentiate between IoT and WoT.	04	L2	CO1
	c.	Explain various networking components of IoT with a neat diagram.	08	L2	CO1
		Module – 2			
Q.3	a.	Define sensor and explain the characteristics of sensor.	06	L1	CO2
	b.	Explain the factors affecting sensorial deviations.	06	L2	CO2
	c.	With a block diagram, explain the functional blocks of a typical sensor node in IoT.	08	L2	CO2
		OR			
Q.4	a.	Differentiate between sensors and actuators.	04	L1	CO2
	b.	Explain the desired characteristics of actuators used in IoT.	06	L2	CO2
	c.	Explain any five classes of actuators.	10	L2	CO2
		Module – 3			
Q.5	a.	What are the different data formats found in IoT network? Explain briefly.	06	L2	CO3
	b.	Explain the importance of processing in IoT.	04	L2	CO3
	c.	With a neat diagram, explain on-site processing topology. Mention its merits and demerits.	10	L2	CO3
		OR			
Q.6	a.	Explain IoT device design and selection considerations.	10	L2	CO3
	b.	With a neat diagram explain collaborative processing technology.	06	L2	CO3
	c.	Explain four offload location types.	04	L2	CO3
		Module – 4			
Q.7	a.	What is virtualization? Explain its advantages from end-user and service provider point of view.	10	L2	CO4
	b.	Explain different types of virtualization in detail.	05	L2	CO4
	c.	Explain service level agreement and its metrics in cloud computing.	05	L2	CO4
		OR			
Q.8	a.	Explain the features of (i) Cloud Analyst (ii) Green cloud	05	L2	CO4
	b.	With a neat diagram, explain the components of an agricultural IoT.	10	L2	CO4
	c.	Explain the advantages of IoT in agriculture.	05	L2	CO4
		Module – 5			
Q.9	a.	Explain the components of vehicular IoT with a neat diagram.	10	L2	CO5
	b.	Explain the advantages and risks in healthcare IoT.	10	L2	CO5
		OR			
Q.10	a.	With a neat diagram, explain the layered architecture of AmbuSens system of healthcare IoT.	10	L2	CO5
	b.	Illustrate the types of machine learning and explain in detail.	10	L3	CO5

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CBCS SCHEME

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BMATC201

Second Semester B.E/B.Tech. Degree Examination, June/July 2025
Mathematics – II for Civil Engineering Stream

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. VTU Formula Hand Book is permitted.

		Module – 1	M	L	C
1	a.	Evaluate $\int_0^4 \int_0^{2\sqrt{z}} \int_0^{\sqrt{4z-x^2}} dy\,dx\,dz$.	7	L3	CO1
	b.	By changing order of integration evaluate $\int_0^a \int_0^{2\sqrt{ax}} x^2 dy\,dx$.	7	L3	CO1
	c.	Define beta and gamma functions. Show that $\sqrt{\frac{1}{2}} = \sqrt{\pi}$.	6	L2	CO1
		OR			
2	a.	Evaluate : $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx\,dy$ by changing into polar coordinator.	7	L3	CO1
	b.	Find the area bounded between parabolas $y^2 = 4ax$ and $x^2 = 4ay$ using double integration.	7	L3	CO1
	c.	Write a modern mathematical program to evaluate the integral $\int_0^3 \int_0^{3-x} \int_0^{3-x-y} xyz\,dz\,dy\,dx$.	6	L3	CO5
		Module – 2			
3	a.	Find the directional derivative at $\phi = 4xz^3 - 2x^2y^2z$ at (2, –1, 2) along the vector $2i - 3j + 6k$.	7	L2	CO2
	b.	If $\phi = x^2 + y^2 + z^2$ and $\vec{F} = \nabla\phi$ then find grad ϕ, div $\vec{F}$ and curl $\vec{F}$.	7	L2	CO2
	c.	Show that $\vec{F} = \frac{x_i + y_j}{x^2 + y^2}$ is both Solenoidal and irrotational.	6	L2	CO2

		OR			
4	a.	Compute the line integral $\int_c [(x^2+xy)dx+(x^2+y^2)dy]$ where c is the square formed by the lines $y=\pm1$ and $x=\pm1$.	7	L2	CO2
	b.	Apply stokes theorem to evaluate $\int_c (ydx+zdy+xdz)$ where c is the curve of intersection $x^2+y^2+z^2=a^2$ and $x+z=a$.	7	L3	CO2
	c.	Write a modern mathematical tool program to find the gradient of $\phi = x^2y+2xz-4$.	6	L3	CO5
		Module – 3			
5	a.	Form the partial differential equation by eliminating the arbitrary constant from the relation. $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$.	7	L2	CO3
	b.	Solve the equation $\frac{\partial^2 z}{\partial u^2}=x+y$ given that $z=y^2$ when $x=0$ and $\frac{\partial z}{\partial x}=0$ when $x=2$.	7	L3	CO3
	c.	Solve $y^2p-xyq=x(z-2y)$.	6	L3	CO3
		OR			
6	a.	Form the partial differential equation by eliminating arbitrary function from the equation $z=y^2+2f\left(\frac{1}{x}+\log y\right)$.	7	L2	CO3
	b.	Solve $\frac{\partial^2 z}{\partial x^2}-2\frac{\partial z}{\partial x}+2z=0$ subject to $z=e^y$ and $\frac{\partial z}{\partial x}=0$ when $x=0$.	7	L3	CO3
	c.	With usual notation derive a one-dimensional heat equation.	6	L2	CO3
		Module – 4			
7	a.	Using the Regula – Falsi method find the fifth root of 10 assuming that the root lies between 1 and 2. Carry out three approximations.	7	L3	CO4
	b.	Given that : x: 0, 1, 2, 3 y = f(x): 1, 3, 7, 13 Find the value of y at x = 0.1, by using appropriate formula.	7	L3	CO4
	c.	Evaluate $\int_0^{\pi/2} \sqrt{\cos\theta}\, d\theta$ by Simpson's $\frac{1}{3}^{rd}$ rule taking 7 ordinates.	6	L3	CO4

OR

8	a.	Use Newton – Raphson method to find the approximate root of the equation $e^x - 3x = 0$ that lies between 0 and 1. Perform and approximate.	7	L3	CO4
	b.	Using Lagranges interpolation formula find f(18) for the data : x: 10, 12, 19, 22 y: 24, 48, 162, 200	7	L3	CO4
	c.	Evaluate $\int_0^1 \frac{1}{1+x^2}dx$ by using Simpson's $\frac{3}{8}^{th}$ rule taking four equal strips.	6	L3	CO4

Module – 5

9	a.	Use Taylor's series method solve the initial value problem $\frac{dy}{dx} = xy - 1$, $y(1) = 2$ at the point $x = 1.02$, consider three non-zero terms.	7	L3	CO4
	b.	Using fourth order Runge–Kutta method find y at x = 0.1, given that $\frac{dy}{dx} = x(1+xy)$, $y(0) = 1$.	7	L3	CO4
	c.	Solve the differential equation $\frac{dy}{dx} = -xy^2$ under the initial condition $y(0) = 2$, by using modified Euler's method at x = 0.1. Take step size h = 0.1. Perform three modification.	6	L3	CO4

OR

10	a.	Employ Taylor's series method to find y at x = 0.1 given that $\frac{dy}{dx} - 2y = 3e^x$, $y(0) = 0$, consider three non-zero terms.	7	L3	CO4
	b.	Applying Milne's predictor – corrector method compute y at x = 0.8, for the data y(0) = 2, y(0.2) = 1.9231, y =(0.4) = 1.7241 and y(0.6) = 1.4706 to the equation $\frac{dy}{dx} = -xy^2$.	7	L3	CO4
	c.	Write a modern mathematical tool program to solve $\frac{dy}{dx} = 2x + y$, $y(1) = z$ by R – K 4^{th} order method.	6	L3	CO4

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CBCS SCHEME

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BMATE201

Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Mathematics – II for EEE stream

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Find the angle between the surface $xy^2z = 3x + z^2$ and $3x^2 - y^2 + 2z = 1$ at the point (1, -2, 1)	7	L3	CO1
	b.	Evaluate curl(curl$\vec{F}$) and div(curl$\vec{F}$) if $\vec{F} = x^2yi + y^2zj + z^2xk$	7	L3	CO1
	c.	Show that the vector $\vec{F} = \frac{xi + yj}{x^2 + y^2}$ is both solenoidal and irrotational.	6	L2	CO2
		OR			
Q.2	a.	Find the total work done by the force $\vec{F} = 3xyi - yj + 2zxk$ in moving a particle around the circle $x^2 + y^2 = 4$.	7	L3	CO1
	b.	Using Green's theorem evaluate $\oint_C (xy + y^2)dx + x^2dy$ over the region bounded by the curves $y = x$ and $y = x^2$	7	L2	CO3
	c.	Using modern mathematical tools, write the code to find gradient of $\phi = x^2y + 2xz - 4$.	6	L2	CO5
		Module – 2			
Q.3	a.	Define a Subspace. Show that any plane passing through the origin is a subspace of R^3.	7	L1	CO1
	b.	Let V be the vector space of all real valued continuous functions over R. Show that the set W of solutions of differential equations $5\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 2y = 0$ is a subspace of V.	7	L2	CO2
	c.	Define a Inner Product space. Consider $f(t) = 3t - 5$ and $g(t) = t^2$, the inner product $\langle f.g \rangle = \int_0^t f(t)g(t)dt$. Find $\langle f \cdot g \rangle$	6	L2	CO2
		OR			
Q.4	a.	Express the vector (3, 5, 2) as a linear combination of the vectors (1, 1, 0), (2, 3, 0), (0, 0, 1) of $V_3(R)$.	7	L2	CO3

	b.	State Rank-Nullity theorem. Verify the Rank-Nullity theorem for the $T: R^3 \to R^3$ defined by T(x, y, z) = (x+2y-z, y+z, x+y-2z)	7	L2	C
	c.	Using the modern mathematical tool, write the code to represent the reflection transformation $T: R^2 \to R^2$ and to find the image of vector (10, 0) when it is reflected about the y-axis.	6	L1	CO4
		Module – 3			
Q.5	a.	Find the Laplace transform of, (i) $e^{-3t}(2\cos 5t - 3\sin 5t)$ (ii) $\frac{\cos at - \cos bt}{t}$	7	L3	CO3
	b.	Given $f(t) = \begin{cases} E, & 0 < t < \frac{a}{2} \\ -E, & \frac{a}{2} < t < a \end{cases}$ where f(t+a) = f(t), show that $L[f(t)] = \frac{E}{S}\tanh\left(\frac{aS}{4}\right)$.	7	L2	CO2
	c.	Express $f(t) = \begin{cases} \cos t, & 0 < t < \pi \\ \cos 2t, & \pi < t < 2\pi \\ \cos 3t, & t > 2\pi \end{cases}$ in terms of the Heaviside unit step function and hence find L[f(t)].	6	L3	CO4
		OR			
Q.6	a.	Find $L^{-1}\left[\frac{2s^2+5s-4}{s^3+s^2-2s}\right]$.	7	L3	CO3
	b.	Using the convolution thorem, find the inverse Laplace Transform of $\frac{s}{(s^2+a^2)^2}$.	7	L3	CO4
	c.	Solve $y''' + 2y'' - y' - 2y = 0$, given $y(0) = y'(0) = 0$ and $y''(0) = 6$ by using Laplace transform method.	6	L2	CO3
		Module – 4			
Q.7	a.	By Newton-Raphson method, find the root of $x\tan x + 1 = 0$ which is near to $x = \pi$.	7	L3	CO2
	b.	Using Newton's forward difference formula find f(38),	7	L3	CO3
	c.	Use Lagrange's interpolation formula to find y at x = 10, given	6	L3	CO3

x	40	50	60	70	80	90
y	184	204	226	250	276	304

x	5	6	9	11
y	12	13	14	16

		OR			
Q.8	**a.**	Find a real root of the equation $x^3 - 2x - 5 = 0$ correct to three decimal places by the method of false position in (2, 3).	**7**	**L4**	**CO4**
	b.	Find the interpolating polynomial using Newton's dividend difference formula for the following data, x: 2, 4, 5, 6, 8, 10 y: 10, 96, 196, 350, 868, 1746	**7**	**L3**	**CO4**
	c.	Use Simpson's $\frac{3}{8}^{th}$ rule to obtain the approximate value of $\int_0^{0.3} (1-8x^3)^{\frac{1}{2}} dx$ by considering 3 equal intervals.	**6**	**L2**	**CO2**
		Module – 5			
Q.9	**a.**	Use Taylor's series method, find y(0.1) considering upto fourth degree term if y(x) satisfies the equation, $\frac{dy}{dx} = x - y^2$, $y(0) = 1$.	**7**	**L3**	**CO3**
	b.	Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$. Compute y(0.2) by taking h = 0.2, using Runge-Kutta method of fourth order.	**7**	**L2**	**CO3**
	c.	Apply Milne's method to compute y(1.4), correct to four decimal places given $\frac{dy}{dx} = x^2 + \frac{y}{2}$ and following the data $y(1) = 2$, $y(1.1) = 2.2156$, $y(1.2) = 2.4649$, $y(1.3) = 2.7514$	**6**	**L2**	**CO2**
		OR			
Q.10	**a.**	Using modified Euler's method to find y at x = 0.2 given $\frac{dy}{dx} = x - y^2$ and $y(0) = 1$ by taking step size $h = 0.1$.	**7**	**L4**	**CO4**
	b.	Using the Runge-Kutta method of fourth order find y(0.1) given that $\frac{dy}{dx} = 3e^x + 2y$, $y(0) = 0$ taking $h = 0.1$.	**7**	**L3**	**CO2**
	c.	Using modern mathematical tools, write the code to find the solution of $\frac{dy}{dx} = x - y^2$ at y(0.1), given that $y(0) = 1$ by Runge-Kutta 4^{th} order method.	**6**	**L2**	**CO3**

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CBCS SCHEME

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BMATC201

Second Semester B.E/B.Tech. Degree Examination, June/July 2025
Mathematics – II for Civil Engineering Stream

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. VTU Formula Hand Book is permitted.

			M	L	C
		Module – 1			
1	a.	Evaluate $\int_0^4 \int_0^{2\sqrt{z}} \int_0^{\sqrt{4z-x^2}} dy\,dx\,dz$.	7	L3	CO1
	b.	By changing order of integration evaluate $\int_0^a \int_0^{2\sqrt{ax}} x^2 dy\,dx$.	7	L3	CO1
	c.	Define beta and gamma functions. Show that $\sqrt{\frac{1}{2}} = \sqrt{\pi}$.	6	L2	CO1
		OR			
2	a.	Evaluate : $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx\,dy$ by changing into polar coordinator.	7	L3	CO1
	b.	Find the area bounded between parabolas $y^2 = 4ax$ and $x^2 = 4ay$ using double integration.	7	L3	CO1
	c.	Write a modern mathematical program to evaluate the integral $\int_0^3 \int_0^{3-x} \int_0^{3-x-y} xyz\,dz\,dy\,dx$.	6	L3	CO5
		Module – 2			
3	a.	Find the directional derivative at $\phi = 4xz^3 - 2x^2y^2z$ at (2, –1, 2) along the vector $2i - 3j + 6k$.	7	L2	CO2
	b.	If $\phi = x^2 + y^2 + z^2$ and $\vec{F} = \nabla\phi$ then find grad ϕ, div $\vec{F}$ and curl $\vec{F}$.	7	L2	CO2
	c.	Show that $\vec{F} = \frac{x_i + y_j}{x^2 + y^2}$ is both Solenoidal and irrotational.	6	L2	CO2

CBCS SCHEME

USN

Second Semester B.E./B.Tech. Degree Examination, June/July 2019

Introduction to Python Programming

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the print( ), input( ) and string concatenation with examples.	06	L2	CO1
	b.	Explain the scope of local and global variables with suitable example.	06	L2	CO1
	c.	Develop a python program to calculate the area and circumference of a circle, input the value of radius and print the result.	08	L3	CO1
		OR			
Q.2	a.	Explain the exception handling mechanism in python. Write a program to solve divide by zero exception.	06	L2	CO1
	b.	Define user defined function. How to pass parameters in functions? Explain with an example.	06	L2	CO1
	c.	Develop a program to generate Fibonacci series of length N. Read the value of N from console.	08	L3	CO1
		Module – 2			
Q.3	a.	Explain the following methods with example: i) index( ) ii) append( ) iii) extend( ) iv) remove( ) v) insert( ) vi) sort( )	06	L2	CO2
	b.	Explain the use of "in" and "not in" operators with suitable examples.	06	L2	CO2
	c.	Develop a program to compute and print mean, variance and standard deviation.	08	L3	CO2
		OR			
Q.4	a.	Define tuple data type. List the differences between tuple and list.	06	L2	CO2
	b.	Explain the following dictionary methods with suitable example: i) keys( ) ii) values( ) iii) items( ) iv) setdefault( )	08	L2	CO2
	c.	Develop a python program to swap two numbers without using intermediate variable.	06	L3	CO2
		Module – 3			
Q.5	a.	Explain the following methods with suitable examples: i) upper( ) ii) isupper( ) iii) lower( ) iv) islower.	08	L2	CO3
	b.	Explain the concept of file handling. Also discuss absolute and relative file path.	06	L2	CO3
	c.	Develop a python program to check whether the given string a palindrome or not palindrome.	06	L3	CO3

		OR			
Q.6	**a.**	Explain the join( ) and Split( ) methods with suitable examples.	**06**	**L2**	**CO3**
	b.	Explain the following methods with examples: i) isalpha( ) ii) isanum( ) iii) isSpace( )	**06**	**L2**	**CO3**
	c.	Illustrate with an example the process of reading from and writing to a file in python.	**08**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Explain the following file operations in python with suitable example: i) Copying files and folders ii) Moving files and folders iii) Deleting files and folders	**06**	**L2**	**CO3**
	b.	What are Assertations? Explain the contents of assert statement with examples.	**08**	**L2**	**CO3**
	c.	Illustrate with an example the concept of walking a directory tree.	**06**	**L2**	**CO1**
		OR			
Q.8	**a.**	Illustrate the logging levels in python.	**06**	**L2**	**CO3**
	b.	List out the differences between Shutil.copy( ) and Shutil.copytree( ) methods.	**06**	**L2**	**CO3**
	c.	Develop a program with a function named DivExp which takes two parameters a and b and returns c (c = a/b). Write suitable assertation for a > 0 in function DivExp and raise an exception for when b = 0. Develop a python program which reads two values from the console and calls a function DivExp.	**08**	**L3**	**CO3**
		Module – 5			
Q.9	**a.**	Define classes and objects in python. Construct a class called rectangle and initialize it with height = 100, width = 200, starting point as (x = 0, y = 0) and write the method to display the center point coordinates of a rectangle.	**08**	**L2**	**CO4**
	b.	Explain __init( )__ and __str( )__ methods with examples.	**06**	**L2**	**CO4**
	c.	Define pure function. Explain the same with an example.	**06**	**L2**	**CO4**
		OR			
Q.10	**a.**	Define a function which takes two objects representing complex numbers and returns a new complex number with a addition of two complex numbers. Define a class 'complex' to represent the complex number. Develop a python program to read N(N >= 2) complex numbers and to compute the addition of N complex numbers.	**08**	**L2**	**CO4**
	b.	Explain the printing of objects with an example.	**06**	**L2**	**CO4**
	c.	Explain the concept of inheritance with an example.	**06**	**L2**	**CO4**

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CBCS SCHEME

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BESCK204E

Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Introduction to 'C' Programming

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Discuss the five generation of computer.	10	L1	CO1
	b.	Mention all input and output devices. Explain any one input and output device.	10	L1	CO1
		OR			
Q.2	a.	With an example, explain the structures of 'C' program.	8	L1	CO1
	b.	What are datatypes? Explain 'C' data types.	6	L1	CO1
	c.	Write short notes on : i) Input/output statements ii) Constants.	6	L1	CO1
		Module – 2			
Q.3	a.	Mention all 'C' operators. Explain any 3 operators with examples.	10	L1	CO2
	b.	Explain if-else and nested-if with their syntax and examples.	10	L1	CO2
		OR			
Q.4	a.	Write a 'C' program to find gcd (Greatest Common Divisor) of 2 numbers.	6	L2	CO2
	b.	With example explain break, continue and goto statements.	8	L2	CO2
	c.	Differentiate while and do-while.	6	L2	CO2
		Module – 3			
Q.5	a.	What are recursive functions? Give its 2 base properties. Write a 'C' recursive program to find factorial of a numbers.	8	L2	CO3
	b.	Explain 'C' storage classes with example for each.	8	L1	CO3
	c.	Explain the terms : i) Function definition ii) Function declaration.	4	L1	CO3

		OR			
Q.6	**a.**	What is an array? Explain various ways of initializing single dimension arrays. Write a 'C' program to search an element using binary search.	**10**	**L2**	**CO3**
	b.	Write a 'C' program to sort 'n' elements in a given list using Bubble sort.	**6**	**L2**	**CO3**
	c.	Write a note on operations on arrays.	**4**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	What is an 2-dimensional array? Explain various ways of initializing two-dimensional arrays. Write a 'C' program to find sum of all elements in a given matrix.	**10**	**L3**	**CO4**
	b.	Write a 'C' program to find product of two matrices.	**10**	**L3**	**CO4**
		OR			
Q.8	**a.**	What is a string? Give an example? Write a 'C' function to copy from one string to another.	**6**	**L1**	**CO4**
	b.	What is scanset? Explain the use of Caret (^) symbol with an example.	**6**	**L2**	**CO4**
	c.	Write a 'C' program to find the length of the string.	**4**	**L3**	**CO4**
	d.	Explain the read and write character functions.	**4**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain any 6 string manipulation function.	**6**	**L2**	**CO5**
	b.	Write a note on pointer arithmetic.	**6**	**L2**	**CO5**
	c.	What is Pointer? Write a 'C' program using pointers to compute sum, mean and standard deviation of all elements stored in an array of 'n' real numbers.	**8**	**L3**	**CO5**
		OR			
Q.10	**a.**	What is a structure? Give its syntax with example. Explain various ways of initializing structure members.	**10**	**L3**	**CO5**
	b.	Write a 'C' program to implement structure to read, write and compute average marks and the students scoring above and below the average marks for a class of 'N' students.	**10**	**L3**	**CO5**

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CBCS SCHEME

USN | | | | | | | | | | |

BCV301

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Strength of Materials

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define the following : i) Stress ii) Poisson's Ratio iii) Volumetric strain iv) Bulk Modulus	06	L1	CO1
	b.	Derive the relation between modulus of rigidity and Young's modulus of elasticity.	06	L3	CO1
	c.	Calculate the modulus of rigidity and bulk modulus of a cylindrical bar of diameter 25 mm and of length 1.2 m, if the longitudinal stream in the bar during a tensile test is four times the lateral strain. Also find the change in volume when the bar is subjected to a hydrostatic pressure of 120 N/mm^2 . Take E = 1.2 x 10^5 MPa.	08	L3	CO1
		OR			
Q.2	a.	Derive an expression for the deformation of a rectangular tapering bar of uniform thickness subjected to an uniaxial load 'P'.	06	L3	CO1
	b.	Draw stress – strain diagram for structural steel subjected to axial ensile force and explain the salient points.	06	L2	CO1
	c.	A concrete column with square section with side 250 mm is reinforced with Four steel bars of 15 mm diameter (each). Determine the stresses induced in concrete and steel bars, when the column is subjected to a load of 300 KN. Take E_{steel} = 200 GPa and $E_{concrete}$ = 14 GPa.	08	L3	CO1
		Module – 2			
Q.3	a.	Define i) Shear Force ii) Bending Moment iii) Point of contraflexture	06	L1	CO2
	b.	Derive the relation between rate of loading, shear force and bending moment.	06	L3	CO2
	c.	Draw the shear force diagram and bending moment diagram for a simply supported beam subjected to the loads as shown in fig. Q.3 (c)	08	L4	CO2

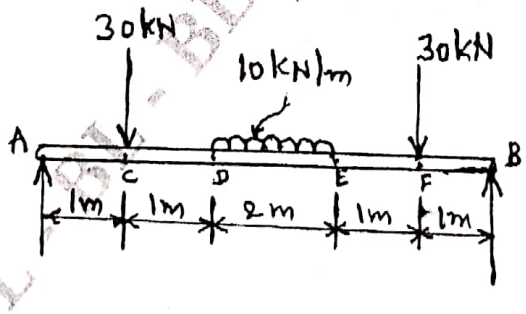

Fig. Q.3 (c)

OR

Q.4	a.	With help of neat sketches, explain different types of beams and different types of loadings.	06	L2	CO2
	b.	Draw shear force and bending moment diagrams for a cantilever beam subjected to uniformly distributed load of intensity WKN/m on its entire length.	06	L3	CO2
	c.	Draw the shear force and bending moment diagrams for a cantilever subjected to Forces as shown in fig. Q.4 (c)	08	L4	CO2

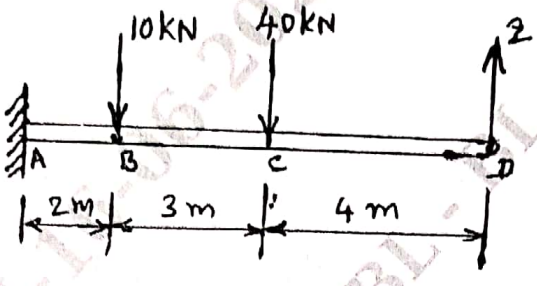

Fig. Q.4 (c)

Module – 3

Q.5	a.	Define i) neutral axis ii) Section Modules iii) Moment of resistance.	06	L1	CO3
	b.	Derive the simple bending equation in the form $\frac{M}{I}=\frac{f}{y}=\frac{E}{R}$ with usual notations.	06	L3	CO3
	c.	A beam is simply supported and carries a uniformly distributed load of 40 kN/m over the entre span. The section of the beam is rectangular having depth as 500 mm. If the maximum stress in the material of the beam is 120 N/ mm^2 and moment of inertia of the section is $7x10^8$ mm^4, find the span of the beam.	08	L3	CO3

OR

Q.6	a.	List the assumptions made in the theory of pure torsion.	06	L1	CO3
	b.	With usual notations derive the torsion equation $\frac{T}{J}=\frac{\tau}{R}=\frac{G\theta}{L}$	06	L3	CO3
	c.	A solid shaft rotating at 500 rpm transmits 30 kw. Maximum torque is 20% more than the mean torque. Material of shaft has the allowable shear stress 65 MP_a and modules of rigidity 81 GP_a. Angle of twist in the shaft should not exceed 1° in 1 meter length. Determine the diameter of shaft.	08	L3	CO3

Module – 4

Q.7	a.	Define i) slope ii) deflection iii) Elastic curve	06	L1	CO4
	b.	Derive the deflection equation $EI\frac{d^2y}{dx^2}=M$	06	L3	CO4
	c.	Derive expressions for maximum slope and deflection in a simply supported beam subjected to point load 'w' at mid point.	08	L3	CO4

OR

Q.8	a.	Define i) slenderness ratio ii) long column iii) short column	06	L1	CO4
	b.	Using Euler's theory, derive an equation for the crippling load of a long column pinned at both ends.	06	L3	CO4
	c.	A hallow circular column is used to carry an automobile of weight 20 KN. Length of the column is 3 meters. Material of column has an yield stress of 330 MPa. Outer diameter of the column is 100 mm and thickness of wall is 5 mm. one end of the column is fixed and other end is free. Taking E = 200GPa , determine : i) Factor of safety ii) ii) Ratio of yield stress to crippling stress.	08	L3	CO4

Module – 5

Q.9	a.	Define i) Principal stresses ii) Principal planes	06	L1	CO5
	b.	An uniform bar is subjected to axial tensile stress of 100 N/mm^2. Determine i) Stress acting on a plane which is at an angle of 60° with reference to 100 N/mm^2 stress plane ii) Magnitudes of maximum and minimum stresses induced and position of their planes iii) Magnitude of normal stress on the plane of maximum shear stress.	06	L3	CO5
	c.	A point in a machine member is subjected to principal stresses of magnitudes 30 MPa in tension and 100 MPa in compression. Determine i) Stresses acting on an element whose normal to one of its faces is oriented at an angle of 120° with reference to x – axis ii) Maximum and minimum shear stresses and their orientations. iii) Normal stresses acting on maximum and minimum shear stress planes.	08	L3	CO5

OR

Q.10	a.	Define : i) Thin cylinder ii) Thick cylinder iii) Hoop stress	06	L1	CO5
	b.	Derive Lame's equation for the redial and hoop stresses for thick cylinder subjected to internal and external fluid pressure.	06	L3	CO5
	c.	A thick walled cylindrical pressure vessel has inner radius of 150 mm and outer radius of 185 mm. Draw a sketch showing the radial pressure and hoop stress distribution in the section of the cylinder wall, when an internal pressure of 10 MPa is applied.	08	L3	CO5

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CBCS SCHEME

USN | | | | | | | | | | |

BCV302

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Engineering Survey

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Briefly explain classification of survey based on object of survey.	8	L1	CO1
	b.	Explain briefly plane table survey and cadastral survey.	8	L2	CO1
	c.	Explain briefly concept of electronic distance measurement.	4	L1	CO1
		OR			
Q.2	a.	What is surveying? Briefly explain classification of survey based on nature survey.	8	L2	CO1
	b.	Explain topographical survey and cadastral survey.	8	L2	CO1
	c.	Explain various types of tapes.	4	L1	CO1
		Module – 2			
Q.3	a.	Explain the measurement of horizontal angle by repetition method with necessary standard tabular format.	8	L2	CO2
	b.	In running fly levels from a benchmark of RL 384.705, the following readings were obtained : Back sight : 3.215, 1.030, 1.295 and 1.885 Fore sight : 1.225, 3.290, 2.085 From the last position of the instrument six pegs at 25 m intervals are to be set out on a uniformly falling of 1 in 100, the first peg is to bare RL of 384.500. Work out the staff readings required for setting the tops of the pegs on the given gradient.	12	L3	CO2
		OR			
Q.4	a.	Explain the following Bench Mark mean sea level, datum, elevation.	8	L2	CO2
	b.	The following consecutive reading were taken with a level and 3 metre leveling staff on a continuously sloping ground at a common interval of 20 meter 0.602, 1.234, 1.860, 2.574, 0.238, 0.914 1.936, 2.872, 0.568, 1.824, 2.722 RL of first point was 192.122. Rule out page of a level field book and enter the above reading. Calculate the reduced levels of the points and also the gradient of the line joining the first and the last point?	12	L3	CO2
		Module – 3			
Q.5	a.	Explain user of contour map.	4	L1	CO3
	b.	Explain characteristics of contours.	8	L2	CO3
	c.	What do you mean by contour? Explain the factors governing the choice of proper contour interval.	8	L2	CO3
		OR			
Q.6	a.	Explain the following station, turning point, fore sight and back sight.	8	L2	CO3
	b.	Explain the procedure for measurements of coordinator using total station.	8	L2	CO3
	c.	With a neat sketch explain profile leveling.	4	L2	CO3

		Module – 4			
Q.7	**a.**	A railway embankment is 10 m wide with side scope 1.5 to 1. Assuming the ground to belevel in a direction transverse to the centre line, calculate the volume by prismoidal and trapezoidal formula contained in length of 120 m, the centre heights at 20 m intervals being in meters 2.2, 3.7, 3.8, 4.0, 3.8, 2.8, 2.5	**10**	**L3**	**CO4**
	b.	The following perpendiculars offsets were taken from a chain line to a curved boundary line at intervals of 15 m in the following order : 0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m Compute the area between the chain, the curved boundary and the end offsets by trapezoid and Simpson's rule.	**10**	**L3**	**CO4**
		OR			
Q.8	**a.**	With a neat sketch derive an expression for simple curve by Rrankine's method.	**10**	**L2**	**CO4**
	b.	Two tangents interest at a chainage of 1190 m, the deflection angle 36°. Compute all the data necessary to set out a curve of radius 300 m by deflection angle method. The peg interval is 30 m. Tabulate the results.	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Explain sources of errors in GPS.	**10**	**L2**	**CO5**
	b.	Explain any two applications and uses of remote sensing and GIS in civil engineering surveying.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain application and advantages of Drone in surveying.	**10**	**L2**	**CO5**
	b.	Explain Drone surveying requirements.	**10**	**L2**	**CO5**

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CBCS SCHEME

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BCV303

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Engineering Geology

Time: 3 hrs. Max. Marks: 100

***Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain briefly the internal structure of earth.	8	L2	CO1
	b.	Explain the role of geology in field of civil engineering.	6	L2	CO1
	c.	What are landslides? Describe the causes and control measures.	6	L2	CO1
		OR			
Q.2	a.	What is an Earthquake? What are the causes and effects of earthquake?	10	L1	CO1
	b.	Write a short note on: i) Tsunami ii) Cyclones	10	L2	CO1
		Module – 2			
Q.3	a.	What are the requirements of good building stones?	10	L1	CO2
	b.	What is mineral? Define, describe the different physical properties which helps in the identification of minerals.	10	L2	CO2
		OR			
Q.4	a.	Describe the following with mineral examples: i) Luster and its types ii) Fracture and its types iii) Hardness iv) Structure	10	L2	CO2
	b.	Describe any two of following minerals: i) Quartz ii) Hematite iii) Pyrite iv) Mica	10	L2	CO2
		Module – 3			
Q.5	a.	What is Weathering? Explain causes and types of weathering.	8	L1	CO3
	b.	What is Soil? Explain soil profile.	6	L2	CO3
	c.	Explain soil Horizon with neat sketch.	6	L2	CO3

		OR			
Q.6	**a.**	Explain the effects of weathering on monumental rocks.	**10**	**L1**	**CO3**
	b.	What are the different types of soil? Differentiate between black cotton soil and lateritic soil.	**10**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Define the terms, i) Dip ii) Strike and iii) Outcrop	**8**	**L1**	**CO4**
	b.	What is fold? With a neat diagram, describe the different parts of fold.	**6**	**L2**	**CO4**
	c.	What is fault? With a neat diagram, describe the different parts of fault.	**6**	**L2**	**CO4**
		OR			
Q.8	**a.**	What is Unconformity? Explain the types of unconformity.	**10**	**L1**	**CO4**
	b.	Name different types of faults. What are the engineering considerations of faults in civil engineering projects?	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	What is Igneous Rock? Give the classification of Igneous Rocks based on origin.	**10**	**L1**	**CO5**
	b.	Explain the primary structures in sedimentary rocks.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain with a neat sketch, ground water investigation by electrical resistivity method.	**10**	**L1**	**CO5**
	b.	What are the factors affecting permeability?	**10**	**L2**	**CO5**

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CBCS SCHEME

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BCV304

Third Semester B.E/B.Tech. Degree Examination, June/July 2025
Water Supply and Waste Water Engineering

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Missing data, if any, may be suitably assumed.

		Module – 1	M	L	C
1	a.	What is meant by per capita demand? What are the different types of water demand? Explain any two water demand in detail.	6	L2	CO1
	b.	The population data for a certain town is given below. Find out the population in the year 2011 and 2021 by incremental increase method.	10	L3	CO1
	c.	Write drinking water standards along with the units for the following parameters : i) pH ii) Turbidity iii) Chloride iv) Iron.	4	L2	CO1

Year	1961	1971	1981	1991	2001
Population	75,000	1,10,000	1,50,000	2,00,000	2,42,000

OR

2	a.	What is design period? Briefly explain any four factors governing design period.	6	L2	CO1
	b.	In two periods of each of 20 years, a city has grown from 30,000 to 1,70,000 and then to 3,00,000. Determine : i) The saturation population ii) The equation of the logistic curve iii) The expected population after next 20 years.	10	L3	CO1
	c.	List the physical and chemical water quality parameters.	4	L1	CO2
		Module – 2			
3	a.	What is Aeration? List the different types of aerators and explain any one aerator in detail.	4	L1	CO3
	b.	The maximum daily demand at a water purification plant has been estimated as 12 million liters per day. Design the dimensions of a suitable sedimentation tank (fitted with mechanical sludge removal arrangements) for the raw supplies, assuming a detention period of 6 hours and the velocity of flow as 20 cm per minute. Assume water depth in the tank as 4 m.	10	L3	CO3
	c.	How is coagulation carried out with alum? Explain with the help of chemical reaction.	6	L2	CO3

		OR			
4	a.	With the help of a neat sketch, explain briefly on filter backwashing process of rapid sand filter.	10	L2	CO
	b.	Design the approximate dimensions of a set of rapid gravity filters for treating water required for a population of 50,000, the rate of supply being 180 liters per day per person. The filters are rated to work 5000 liters per hour per square meter. Assume two units to be designed and maximum demand is 1.8 time the average daily demand. Take length as 1.5 times the breadth.	10	L3	CO
		Module – 3			
5	a.	List minor methods of disinfection and explain any two methods in detail.	6	L1	CO
	b.	Describe types of sewerage system with their advantages and disadvantages.	6	L2	CO
	c.	The BOD of a sewage incubated for one day at 30°C has been found to be 110 mg/ℓ. What will be the 5-day 20°C BOD? Assume $K_1 = 0.1$ at 20°C.	8	L3	CO
		OR			
6	a.	With the chemical equations, explain how hardness is reduced from water by lime-soda process.	8	L2	CO
	b.	The following observations were made on a 3% dilution of wastewater. Dissolved Oxygen (DO) of aerated water used for dilution = 3 mg/ℓ Dissolved Oxygen (DO) of diluted sample after 5 days incubation = 0.8 mg/ℓ Dissolved Oxygen (DO) of original sample = 0.6 mg/ℓ Calculate the BOD of 5 days and ultimate BOD of the sample assuming that the deoxygenating coefficient at test temperature is 0.1.	12	L3	CO
		Module – 4			
7	a.	Write the flow diagram employed for municipal wastewater treatment plant. Explain each unit with its importance in flow diagram.	8	L2	CO
	b.	An average operating data for conventional activated sludge treatment plant is as follows : i) Wastewater flow = 35,000 m^3/d ii) Volume of aeration tank = 10900 m^3 iii) Influent BOD = 250 mg/ℓ iv) Effluent BOD = 20 mg/ℓ v) Mixed liquor suspended solids (MLSS) = 2500 mg/ℓ vi) Effluent suspended solids = 30 mg/ℓ vii) Waste sludge suspended solids = 9700 mg/ℓ viii) Quantity of waste sludge = 220 m^3/d Based on the information above, determine : i) Aeration period (hours) ii) Food to microorganism ratio (F/m) (kg BOD per day / kg MLSS) iii) Percentage efficiency of BOD removal iv) Sludge age (days).	12	L3	CO

		OR			
8	a.	What do you mean by unit operation and unit process in waste water treatment plant? Give examples.	6	L1	CO4
	b.	Explain the different types of screens.	6	L2	CO4
	c.	With the neat sketch, explain how oil and grease is removed from wastewater.	8	L2	CO4
		Module – 5			
9	a.	Determine the size of a high rate trickling filter for the following data : Sewage flow = 5 MLD Recirculation ratio = 1.5 BOD of raw sewage = 230 mg/ℓ BOD removal in primary clarifier = 30% Final effluent BOD desired = 25 mg/ℓ Depth of the filter = 1.8 m.	10	L3	CO4
	b.	With the neat sketch, explain the algae bacteria symbiosis in stabilization pond.	6	L2	CO5
	c.	Write a short note on Rotating Biological Contractor (RBC).	4	L1	CO4
		OR			
10	a.	A single stage filter is to treat a flow of 3.79 MLD of raw sewage with BOD of 240 mg/ℓ. It is to be designed or a loading of 11,086 kg of BOD in raw sewage per hector meter and the recirculation ratio is to be 1. What will be the strength of the effluent, according to the recommendation of the national research council of USA?	10	L3	CO4
	b.	Write a neat sketch, explain the constructional details of sludge digestion tank.	6	L2	CO4
	c.	Write short notes on sludge drying beds.	4	L1	CO5

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CBCS SCHEME

BCV358D

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Question Paper Version : A

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Personality Development for Civil Engineers

Time: 1 hr.] [Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. We have the choice everyday about what _____ we are going to have for the rest of Day"
   a) Stress b) Mission c) Thoughts d) Attitude

2. Positive working condition is one of the methods used for changing the attitude of the employee
   a) True b) False

3. Goals should be
   a) Specific b) Measurable c) Achievable d) All of these

4. Which of the following can be considered as internal motivation
   a) Love b) Reward c) Appreciation d) Recognition

5. Strength and weakness analysis starts with
   a) Knowing others b) Understanding feeling of others
   c) Identifying others faults and weakness d) Knowing yourself

6. What does 'S' stand for in 'SMART' method of goal setting?
   a) Smart b) Short c) Specific d) None of these

7. _____ is the practice of focusing on his/her mind
   a) Yoga b) Physical exercise c) Meditation d) Walking

8. Importance of stress management are/is
   a) Improves mood b) Boots immune system
   c) Increases efficiency d) All of these

9. Which of the following can be considered as external motivation?
   a) Reward b) Appreciation c) Recognition d) All of these

10. Converting weakness into strength and strength into and exceptional talent is called
a) Self awareness b) Self confidence c) self reliance d) Self regulation

11. How to be a successful person?
a) Separates out what's important b) Focus on end result
c) Successful in career and life d) All of these

12. Which of the following shows a positive facial expansion
a) Frowning while concentrating b) Maintaining lye contact
c) Smiling continuously d) Rolling up your eyes

13. Straight body posture shows
a) Pride b) Professionalism c) Confidence d) Humility

14. The body of the cover letter describes the applicants _____ to distinguish him from other applicants
a) Education b) Experience c) Strong areas d) Achievements

15. Reading is a _____ which involves visual perception as well as mental decoding of the symbols
a) Cognitive process b) Behavioral process
c) Reasoning process d) None of these

16. Which of the following is an example of oral communication?
a) Newspaper b) Letters c) Phone call d) e-mail

17. _____ is an instance of non verbal communication
a) Speech b) Proximity c) A notice d) An e-mail

18. Which method is good for taking leave in the office
a) Website b) Notice/posters c) E-mail d) Business meetings

19. The 1st language which we learn or speak as a child _____
a) Jargon b) Dialect c) Mother d) Vernacular tongue

20. A resume is drafted with an objective to highlight your _____
a) Education and experience to the potential employer
b) Achievements
c) Qualifications
d) Skills

21. A seminar is _____
a) A type of conference
b) A structured meeting with an educational purpose
c) A regularly scheduled appointment
d) A gathering called to discuss a work issue

22. _____ are documents presenting a compilation of facts are number of options and related conclusions and recommendation
a) Notice b) Instructions c) Remarks d) Reports

23. There are 3 features that together characteristic report writing at a very basic level. Identify the wrong one
a) Pre defined structure b) Independent section
c) Unbaised conclusion d) With or without purpose

24. _____ can be presented by face
a) Gestures b) Body language c) Para language d) Expressions

25. In a group decision, the discussion must be directed to its logical conclusion
a) True b) False

26. Public speaking is addressing a gathering
a) True b) False

27. Which of these should be avoided for an effective speed
a) Determination of the purpose
b) Selection of message
c) Lack of interest
d) Selection of Theme

28. When sending a message, you should copy ("cc") :
a) To everyone in the department
b) To your boss and his boss
c) Only to those people who absolutely need to know
d) The whole organization

29. Before sending a very large attachment in email one must
a) Just attach and send
b) Send it 1st thing in morning and call to make sure it was received
c) Send it during week days
d) Compress the file, and ask the receiver when is best time to e mail it

30. Which of these should be avoided for effective speech
a) Planning of speech b) Long sentences
c) Preparation of speech d) Organisation

31. Which of these is not a type of entrepreneurship
a) Small business entrepreneurship
b) Scalable entrepreneurship
c) Large scale entrepreneurship
d) Intrepreneurship

32. When writing an email message, paregraphs should
a) Be long b) Be short c) Be indented d) Be invisible

33. Which of following is considered to be poor email etiquette
a) Keeping the message persona
b) Responding to messages as soon as possible
c) Using hot of capital letters to highlight
d) Using clear subject lines

34. Public speaking is only verbal activity
a) True b) false

35. In a group discussion, one must communicate with
a) Hostility b) Ignorance c) Knowledge d) Long sentences

36. A _____ is a systematic series of actions or operations of a series of changes directed to some end.
a) Task b) Process c) Activity d) Action

37. Communication is a _____ process in which there is an exchange and change of ideas towards a mutually acceptable direction
a) One way b) Two way c) Three way d) Four way

38. Which type of feedback support student development from their current level of achievement
a) Specific feedback b) Descriptions feedback
c) None Specific feedback d) None of these

39. Using abbreviations in communication leads to which type of communication barrier
a) Language b) Physical c) Cultural d) Organisational

40. Which can be used to overcome the communication barrier
a) Using translator b) Writing a letter
c) Not communicating d) Using your own language

41. Which of following is positive facial expression
a) Staring hard b) Wrinkled forehead
c) Looking somewhere else d) Nodding while listening

42. _____ refers to communication that is within the organization and is designed to not reach outside organisation
a) External communication b) Written communication
c) Electronic communication d) Internal communication

43. Visual communication are dependent on
a) Signs symbols and pictures b) Text messages
c) Posture d) Body language

44. Which of these factors is not required to determine the purpose of speech
a) Providing information b) Discouragement
c) Accepting ideas d) Entertainment

45. The element which is not part of critical thinking standards
a) Clarity b) Relevance
c) Relativistic thinking d) Completeness

46. What is definition of critical thinking
a) High level thinking that arms to solve a problem
b) Finding faults and weakness is other people arguments
c) Logically analyzing arguments is a critical way
d) Disciplined thinking and judgment

47. The skills related to critical thinking are analysis, communication, creativity, open mildness and problem solving
a) True b) False

48. The sources of innovation includes
a) Opportunity b) Failure c) Rejection d) Execution

49. Brain storming is one of the problem solving technique
a) True b) False

50. Motivation includes
a) Job enrichment b) Job relation c) Job enlargement d) All of these

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CBCS SCHEME

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BCV306C

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Sustainable Design Concept for Building Services

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain carbon foot print and net zero is carbon offsetting.	10	L2	CO1
	b.	Explain the key strategies and principles associated with sustainable construction and resource management.	10	L2	CO1
		OR			
Q.2	a.	Explain in brief the influence of climate on design, construction and performance of buildings.	10	L2	CO1
	b.	Write short notes on : (i) Solar angles and sunpath diagram. (ii) Design of shading system	10	L2	CO1
		Module – 2			
Q.3	a.	Identify various building elements through which heat gain occurs and brief.	10	L2	CO2
	b.	List the (i) Measures on building acoustics (ii) Defects, prevention of sound transmission	10	L2	CO2
		OR			
Q.4	a.	What is Indoor Air Quality? List the ill effects of Indoor Air Quality.	10	L2	CO2
	b.	Enumerate the strategies for enhancing visual comfort in buildings through day lighting and artificial lighting.	10	L2	CO2
		Module – 3			
Q.5	a.	Discuss in detail energy efficiency in building evelope, energy efficient HVAC and lighting as per ECBC2017.	12	L2	CO3
	b.	What are the benefits of rainwater harvesting	8	L2	CO3
		OR			
Q.6	a.	Briefly explain different types of waste and its treatment methods.	12	L2	CO3
	b.	Discuss waste management system in healthcare facilities.	8	L2	CO3
		Module – 4			
Q.7	a.	Explain life cycle assessment and its types.	10	L2	CO4
	b.	Explain different phases of green building project management.	10	L2	CO4
		OR			
Q.8	a.	Explain low carbon cement and zero emission bricks with examples.	10	L2	CO4
	b.	Explain green house gas emission, sources and its effects.	10	L2	CO4
		Module – 5			
Q.9	a.	Write short notes on : (i) LEED (ii) BREEAM (iii) IGBC (iv) GRIHA	20	L2	CO5
		OR			
Q.10	a.	Explain : (i) Pre-design credits (ii) Detailed design credits (iii) Preconstruction credits (iv) Post construction credits	20	L2	CO5

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CBCS SCHEME

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BCV401

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Analysis of Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Difference between statically determinate and indeterminate beams with example.	6	L1, L2	CO1
	b.	Define degree of freedom. What is the degree of freedom for a i) Fixed support ii) Hinged support.	4	L1, L2	CO1
	c.	Determine static and kinematic indeterminacy for the following shown in Fig.Q.1(c).	10	L3	CO1

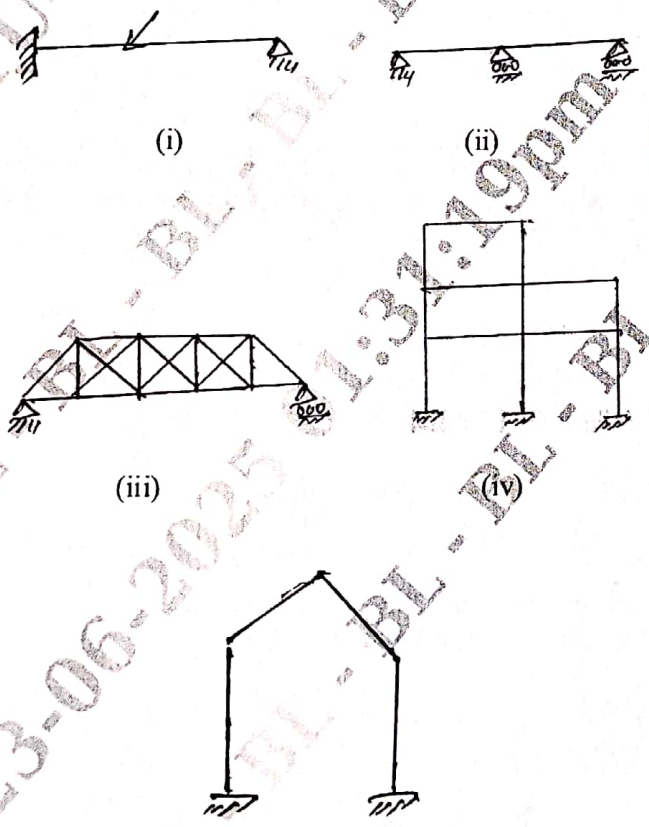
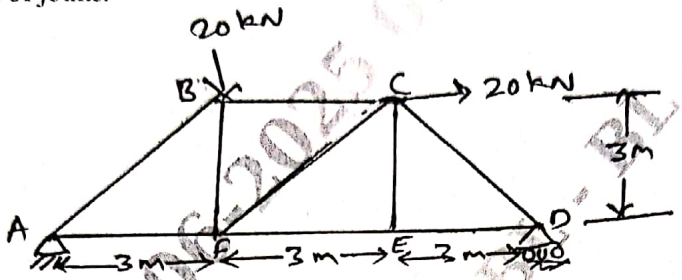
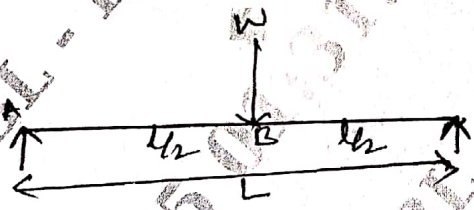
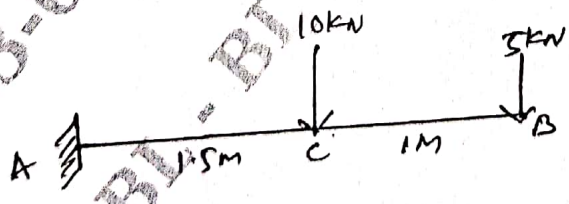


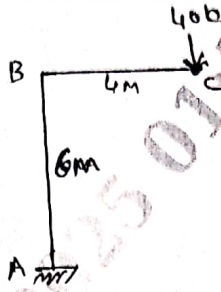
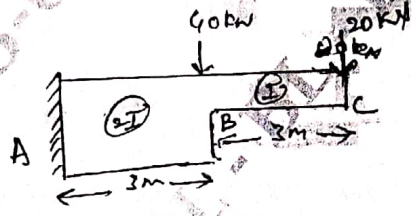
Fig.Q.1(c)

OR

Q.2	a.	Difference between linear and non linear system.	3	L1, L2	CO1
	b.	What are the assumptions in the analysis of trusses?	5	L1, L2	CO1
	c.	Determine the forces in all the members of the truss shown in Fig.Q.2(c) by method of joints.  Fig.Q.2(c)	12	L3	CO1

Module – 2

Q.3	a.	Derive the expression for strain energy stored in an prismatic element subjected to pure bending.	6	L3	CO2
	b.	Determine slope and deflection for the simply supported beam subjected to point load at mid span shown in Fig.Q.3(b) by moment area method.  Fig.Q.3(b)	7	L3	CO2
	c.	Determine the slope and deflection at the free end of a cantilever beam as shown in Fig.Q.3(c) by moment area method (Take EI = 4000 kNm^2).  Fig.Q.3(c)	7	L3	CO2

		OR			
Q.4	**a.**	Derive an expression for strain energy due to shear force.	**6**	**L3**	**CO2**
	b.	Determine the vertical deflection at point 'C' for the frame shown in Fig.Q.4(b) using Castigliano's theorem. EI = 16×10^4 kN-m^2.  Fig.Q.4(b)	**7**	**L3**	**CO2**
	c.	Determine slope and deflection at the free end of a cantilever beam as shown in Fig.Q.4(c) EI = 4×10^5 kN-m^2. Use moment area method.  Fig.Q.4(c)	**7**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Show that the bending moment at any section as a three hinged parabolic arch of span '*l*' and rise 'h' carrying udl of w/m over the entire span is zero.	**6**	**L3**	**CO3**
	b.	A three hinged parabolic arch of 20 m span and rise 5 m, carries a UDL of 40 kN/m on the entire span and a point load of 200 kN at 5 m from right end. Determine reaction, also determine BM, normal thrust and radial shear at 5 m from left support.	**14**	**L3**	**CO3**
		OR			
Q.6	**a.**	A cable of span 20 m and dip 4 m carries a UDL of 20 kN/m over the entire span. Find: i) Maximum tension in the cable ii) Minimum tension in the cable iii) Length of cable.	**10**	**L3**	**CO3**
	b.	A three hinged parabolic arch of span 20 m and rise 4 m carries a UDL of 20 kN/m over the left half of span. Find the maximum BM for the arch and also determine normal thrust and radial shear at a point 5 m from left support.	**10**	**L3**	**CO3**

Module – 4

Q.7		Analyze the continuous beam shown in Fig.Q.7 by using slope deflection method. Draw BMD, SFD and elastic curve.	**20**	**L4**	**CO4**

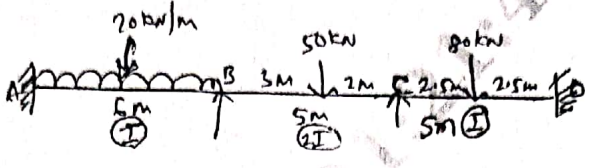


Fig.Q.7

OR

Q.8		Analyze the portal frame shown in Fig.Q.8 by slope deflection method, draw BMD and elastic curve.	**20**	**L4**	**CO4**

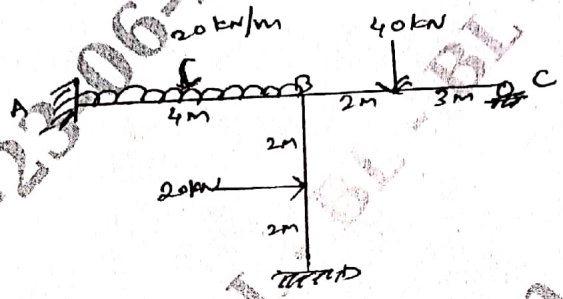


Fig.Q.8

Module – 5

Q.9		Analyze the continuous beam shown in Fig.Q.9 by moment distribution method. Draw BMD and elastic curve.	**20**	**L4**	**CO5**

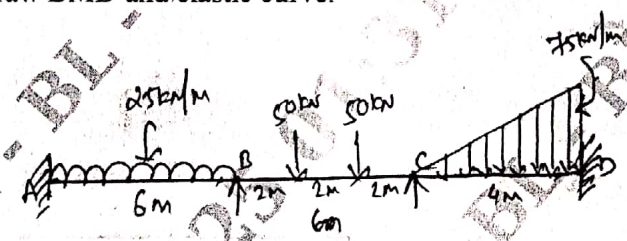


Fig.Q.9

OR

Q.10		Analyze the portal frame as shown in Fig.Q.10 by moment distribution method and draw BMD.	**20**	**L4**	**CO5**

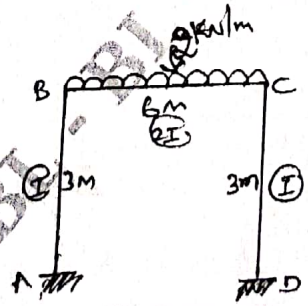


Fig.Q.10

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CBCS SCHEME

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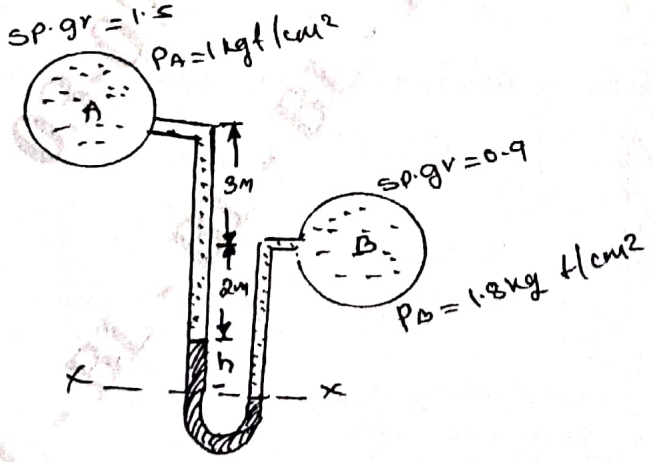
BCV402

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Fluid Mechanics and Hydraulics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define the following and mention their units: i) Capillarity ii) Surface tension (iii) Viscosity	06	L2	CO1
	b.	Calculate the density, specific weight and weight of one litre of petrol of specify gravity = 0.7	06	L3	CO1
	c.	The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 meter per sec requires a force of 98.1 N to maintain the speed. Determine (i) The dynamic viscosity of the oil in poise (ii) The kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.95.	08	L3	CO1
		OR			
Q.2	a.	State and prove Pascal's law.	06	L2	CO1
	b.	An open tank contains water upto a depth of 2 m and above if an oil of sp. gr. 0.9 for a depth of 1 m. Find the pressure intensity (i) at the interface of the two liquids (ii) at the bottom of the tank.	06	L3	CO1
	c.	A differential manometer is connected the two points A and B of two pipes as shown in Fig.Q2(c). The pipe A contains a liquid of sp.gr. = 1.5. While pipe B contains a liquid of sp. gr. = 0.9. The pressure at A and B are 1 kgf/cm^2 and 1.80 kgf/cm^2 respectively. Find the difference in mercury level in the differential manometer.  Fig.Q2(c)	08	L3	CO1

		Module – 2			
Q.3	**a.**	Derive the expression for Euler's equation of motion.	**08**	**L2**	**CO2**
	b.	Water is flowing through a pipe having diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and pressure at the upper end is 9.81 N/cm^2. Determine the difference in datum head if the rate of flow through pipe is 40 lt/s.	**08**	**L4**	**CO2**
	c.	List the assumption made in the derivation of Bernoulli's equation.	**04**	**L2**	**CO2**
		OR			
Q.4	**a.**	Derive the equation for discharge through venturimeter. Explain with neat sketch.	**08**	**L2**	**CO2**
	b.	An orifice meter with orifie diameter 10 cm is inserted in a pipe of 20 cm diameter. The pressure gauge fitted upstream and downstream of the orifice meter gives reading of 19.62 N/cm^2 and 9.81 N/cm^2 respectively. Coefficient of discharge for the meter is given as 0.6. Find the discharge of water through pipe.	**06**	**L4**	**CO2**
	c.	A pitot-static tube placed in the centre of a 300 mm pipeline has one orifice pointing upstream and other perpendicular to it. The mean velocity in the pipe is 0.80 of the central velocity. Find the discharge through the pipe if the pressure difference between the two orifices is 60 mm of water. Take the coefficient of pitot tube as $C_v = 0.98$.	**06**	**L4**	**CO2**
		Module – 3			
Q.5	**a.**	Define hydraulic coefficients for an orifice and give the relation between them.	**06**	**L2**	**CO3**
	b.	Find the discharge from a 100 mm diameter external mouth piece, fitted to a side of a large vessel if the head over the mouth piece is 4 meters.	**06**	**L4**	**CO3**
	c.	Derive the expression for discharge through a triangular notch.	**08**	**L2**	**CO3**
		OR			
Q.6	**a.**	Derive Darcy – Weisbach equation for head loss due to friction in a pipe.	**08**	**L2**	**CO3**
	b.	List the any four minor losses in a pipe flow with expression.	**06**	**L2**	**CO3**
	c.	Write the short notes on the following : i) Pipes in series ii) Equivalent pipe iii) Pipes in parallel	**06**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Distinguish between (i) Gradually varied flow and rapidly varied flow (ii) Total energy and specific energy (iii) Subcritical and super critical flow	**06**	**L2**	**CO**

Q.7	b.	A rectangular channel is 2.5 m wide and has a uniform bed slope of 1 in 500. If the depth of flow is constant 1.7 m. Calculate (i) The hydraulic mean depth (ii) The velocity of flow (iii) The volume rate of flow Assume that the value of the coefficient C in Chezy's formula is 50.	06	L3	CO4
	c.	Determine the most efficient section of a trapezoidal channel with side slope of 1 vertical to 2 horizontal. The channel carries a discharge of 11.25 m^3/s with a velocity of 0.75 m/s. What should be the bed slope of the channel? Take Mannings n = 0.025 .	08	L3	CO4
		OR			
Q.8	a.	Derive Chezy's equation for uniform rate of flow in a channel.	08	L2	CO4
	b.	For most economical rectangular channel prove that half of the width equal to depth of flow in channel.	06	L3	CO4
	c.	Explain critical depth and critical velocity.	06	L2	CO4
		Module – 5			
Q.9	a.	State Impulse - Momentum equation. Give its application.	06	L2	CO5
	b.	A 75 mm diameter water jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45° to the axis of the jet. Find the normal pressure on the plate, when the plate is moving with a velocity of 15 m/s and away from the jet, the normal force on the plate.	06	L4	CO5
	c.	A jet of water of diameter 7.5 cm strikes a curved plate at its centre with a velocity of 20 m/s. The curved plate is moving with a velocity of 8 m/s in the direction of jet. The jet is deflected through an angle of 165°. Assuming the plate smooth find: (i) Force exerted on the plate in the direction of jet. (ii) Power of the jet (iii) Efficiency of the jet	08	L4	CO5
		OR			
.10	a.	Explain various efficiency of centrifugal pump.	06	L2	CO5
	b.	List the difference between Impulse and Reaction turbine.	06	L2	CO5
	c.	Explain classification and types of turbines.	08	L2	CO5

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BCV403

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Transportation Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the role of transportation in social and economic development of country.	10	L2	CO1
	b.	Enumerate the steps for practical design of super elevation considering mixed traffic as per IRC guidelines.	10	L2	CO1
		OR			
Q.2	a.	Explain the factor affecting geometric design of highways.	10	L2	CO1
	b.	Calculate the safe stopping sight distance for design speed of 50 Kmph for i) Two way traffic on two lane road ii) Two way traffic on a single lane road Assume f = 0.37 and reaction time t = 2.5 Sec.	10	L3	CO1
		Module – 2			
Q.3	a.	Explain the desirable properties of road aggregates. List the various tests to access these properties.	10	L2	CO2
	b.	Explain the factors controlling design of flexible highway pavement.	10	L2	CO2
		OR			
Q.4	a.	With neat sketches, explain the following types of joints in CC pavement. i) Expansion Joint ii) Contraction Joint	10	L2	CO2
	b.	With neat sketches, explain the different methods of providing subsurface drainage system.	10	L2	CO2
		Module – 3			
Q.5	a.	What are the various road user characteristics? Explain any two characteristics.	10	L2	CO3
	b.	What are the different traffic engineering studies carried out for collecting traffic data? Explain any two methods.	10	L2	CO3

OR

Q.6	a.	What are the various methods of conducting speed and delay survey? Explain the floating car method of survey.	10	L2	CO3
	b.	Spot speed studies are carried out at a certain stretch of a highway with mixed flow and the consolidated data collected are given below :	10	L3	CO3

Speed rang Kmph	No. of vehicles observed	Speed range Kmph	No. of vehicles observed.
0 to 10	12	50 to 60	255
10 to 20	18	60 to 70	119
20 to 30	68	70 to 80	43
30 to 40	89	80 to 90	33
40 to 50	204	90 to 100	9

Determine :

i) Upper and lower speed limits for regulations.

ii) Design speed for checking the geometric design elements of the highway.

Module – 4

Q.7	a.	What do you understand by a permanent way? Mention the requirement of an ideal permanent way.	10	L2	CO4
	b.	What are the functions and requirements of rails?	10	L2	CO4

OR

Q.8	a.	What are the functions and requirements of sleepers?	10	L2	CO4
	b.	What are the functions and requirements of ballast?	10	L2	CO4

Module – 5

Q.9	a.	What are the various factors considered in the selection of suitable site for airport?	10	L2	CO5
	b.	An airport is planned at an elevation of 380 m above MSL. The monthly mean of maximum and average daily temperature for the hottest month at the site are 40°C and 28°C respectively. The effective gradient is 0.18 percent. Determine the length of runway required at the proposed site if the basic runway length is 1900 m.	10	L3	CO5

OR

Q.10	a.	List and explain aircraft characteristics which affect planning and design of airport.	10	L2	CO5
	b.	What is wind rose diagram? Explain any one method of orientation of runway with wind rose diagram.	10	L2	CO5

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BCV405D

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Watershed Management

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What is a watershed? What are the different categories of watershed?	10	L2	CO1
	b.	Discuss the importance of hydrology in watershed management.	10	L2	CO1
		OR			
Q.2	a.	Describe Distribution of surface and ground water availability on the earth.	12	L2	CO1
	b.	Explain effect of Human influence in the Water Resource System.	8	L2	CO1
		Module – 2			
Q.3	a.	Define IWRM (Integrated Water Resource Management). Discuss three principles of IWRM.	8	L2	CO2
	b.	Explain morphometric analysis of watershed.	12	L2	CO2
		OR			
Q.4	a.	Discuss different watershed management practices in Arid and Semi-Arid Regions.	10	L2	CO2
	b.	What are the long term and short term strategic planning of watershed management.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain different perspective on Recycle and Reuse of Water Resources.	8	L2	CO3
	b.	What is wastewater Reclamation? Explain.	6	L2	CO3
	c.	Write a note on Water Conservation.	6	L2	CO3
		OR			
Q.6	a.	Discuss the importance of water harvesting in water conservation.	10	L2	CO3
	b.	Explain different Rainwater Harvesting structures.	10	L2	CO3
		Module – 4			
Q.7	a.	What are the different methods of integrated watershed management?	7	L2	CO4
	b.	Write a note on Soil Erosion and Water Conservation.	7	L2	CO4

	c.	How integrated farming will be helpful in water management. Explain.	6	L2	CO4
		OR			
Q.8	a.	Explain about Land capability classes along with their characteristics.	10	L2	CO4
	b.	Discuss natural resource management under watershed approach.	10	L2	CO4
		Module – 5			
Q.9	a.	What is Remote sensing? Discuss role of Remote Sensing in watershed management.	12	L2	CO5
	b.	Discuss GIS and its components.	8	L3	CO5
		OR			
Q.10	a.	Explain Role of decision support system in watershed management.	10	L2	CO5
	b.	Discuss watershed characteristics of Costal Region.	10	L2	CO5

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CBCS SCHEME

BCV456C

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Question Paper Version : B

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Electronic Waste Management : Issue & Challenges

Time: 1 hr.] [Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. India's first E-waste clinic was inaugurated in _____.
   a) West Bengal b) Andhra Pradesh
   c) Tamil Nadu d) Madhya Pradesh

2. What is the Primary Legislation governing E-Waste management in India?
   a) Environmental Protection Act, 1986
   b) E-Waste (management) Rules, 2016
   c) Hazardous waste (Management and Handling) Rules, 1989
   d) Public Liability Insurance Act, 1991

3. Under the E-waste (management) Rules, 2016, which entity is primarily responsible for the collection and disposal of E-waste?
   a) Consumers b) Producers
   c) Municipal corporations d) Central Pollution Control Board (CPCB)

4. What does the term "Extended Producer Responsibility (EPR) mean in the context of Indian E-waste management laws?
   a) Producers are responsible for the entire lifecycle of their products, including disposal.
   b) Consumers are responsible for returning E-Waste to collection centers.
   c) Municipalties are responsible for E-waste collection and recycling
   d) Importers are responsible for ensuring that E-waste is properly managed

5. Which type of E-waste is typically NOT covered under India's E-waste (Management) Rules, 2016?
   a) Personal computers b) Mobile phones
   c) Household batteries d) Television sets

6. What is the penalty for non-compliance with the E-waste (management) Rules, 2016 in India?
   a) No Penalty
   b) Monetary fines and imprisonment
   c) Warning letters
   d) Product recall

7. Which international agreement influences India's regulations on E-waste, particularly regarding the transboundary movement of Hazardous waste?
   a) Kyoto protocol
   b) Basel convention
   c) Montreal protocol
   d) Paris agreement

8. Under the E-waste (Management) Rules, 2016, what is required of producers regarding E-waste targets?
   a) They must reduce production of electronics.
   b) They must meet specific E-waste collection target annually.
   c) They must Export all E-waste for recycling
   d) They must only use biodegradable material in production

9. Which ministry is primarily responsible for formulating policies and regulations related to E-waste management in India?
   a) Ministry of commerce and industry
   b) Ministry of Environment, Forest and climate change
   c) Ministry of Home Affairs
   d) Ministry of Electronics and Information Technology

10. What is the main role of the CPCB under the E-waste management regulations in India?
   a) Manufacturing Electronic devices
   b) Monitoring and Ensuring compliance with the E-waste rules
   c) Selling recycled materials
   d) Educating consumers about electronic products

11. What is the term used to describe the illegal export of E-waste to developing countries?
   a) Green washing
   b) E-cycling
   c) E-waste dumping
   d) Digital divide

12. What is the primary goal of E-waste recycling?
   a) To reduce landfill waste
   b) To increase production costs
   c) To encourage digital innovation
   d) To promote E-commerce

13. Which organization often provides drop-off location for E-waste recycling?
   a) Super markets
   b) Restaurants
   c) Municipalties
   d) Libraries

14. Which component of E-waste is most difficult to recycle?
   a) Batteries
   b) Circuit boards
   c) Plastics
   d) Glass

15. Which industry often reuses old electronics for remanufacturing?
   a) Automotive
   b) Agriculture
   c) Fashion
   d) Mining

16. Which emerging technology shows the most promise for increasing the efficiency of E-waste recycling by recovering valuable materials from complex electronic products?
a) Mechanical shredding
b) Incineration
c) Hydrometallurgical processes
d) Pyrolysis

17. Which toxic compound is not found in E-waste?
a) Mercury
b) Cadmium
c) Neon
d) Lead

18. How much lead is in a Cathode Ray Tube (CRT), commonly called a picture tube?
a) 1.75 pounds
b) Between 2 and 3 pounds
c) 19 pounds
d) Between 4 and 7 pounds

19. Nickel is released from _____,
a) Display
b) Calculator
c) Alloy
d) Transformer

20. What is one way to encourage E-waste recycling among consumers?
a) Providing fewer recycling options
b) Promoting Single-use electronics
c) Offering incentives for returning old electronic
d) Discouraging repair and reuse

21. Which of the following is considered E-waste?
a) Food scraps
b) Old computers
c) Used Paper
d) Glass Bottles

22. Which of the following is NOT a type of E-waste?
a) Refrigerators
b) Televisions
c) Aluminium cans
d) Smartphone

23. What valuable metal is commonly extracted from old mobile phones?
a) Iron
b) Copper
c) Silver
d) Platinum

24. LCD screens often contain which toxic substance?
a) Cadmium
b) Beryllium
c) Arsenic
d) Mercury

25. Which type of E-waste is known for containing significant amounts of rare earth elements?
a) Hard drives
b) Keyboards
c) Printers
d) Speakers

26. What is the main environmental concern with disposing of batteries improperly?
a) Soil Enrichment
b) Water pollution
c) Noise pollution
d) Air pollution

27. Why is recycling of E-waste important?
a) It reduces the need for new land fills
b) It conserves natural resources
c) It prevents toxic substances from contaminating the environment
d) All of these

28. What is a common valuable metal found in the wiring of electronic devices?
a) Iron b) Copper c) Aluminium d) Nickel

29. What is a primary reason for the rapid increate in E-waste generation?
a) Increased usage of electronic devices
b) Longer life span of electronic devices
c) Decreased population of electronic devices
d) Reduction in Electronic waste recycling programs

30. Which component of E-waste contains the most copper?
a) LCD screens b) Power cables
c) Plastic casings d) Batteries

31. What does E-waste stands for?
a) Environmental Waste b) Electronic Waste
c) Ecological Waste d) Energy Waste

32. Which of the following is considered E-Waste?
a) Old news papers b) Broker television
c) Used plastic bottles d) Left over food

33. Why is E-waste management important?
a) To reduce plastic pollution
b) To manage Household waste
c) To mitigate the release of toxic substances into the environment
d) To decrease water usage

34. Which toxic substance is commonly found in E-waste?
a) Lead b) Carbon dioxide c) Methane d) Helium

35. Which of the following is NOT a common component of E-waste?
a) Batteries b) Food packaging c) Circuit boards d) Display screens

36. Which method is often to recycle E-waste?
a) Land filling b) Incineration
c) Shredding and Separation d) Composting

37. What hazardous material is commonly found in CRT monitors?
a) Mercury b) Arsenic
c) Cadmium d) Lead

38. Which country is known for generating the most E-waste?
a) China b) United states
c) India d) Germany

39. How can consumers help reduce E-waste?
a) By using disposable electronics
b) By buying new Gadgets frequently
c) By repairing and reusing devices
d) By discarding old electronics in regular trash bins

40. Which of the following materials can be recovered from E-waste?
a) Gold b) Silver c) Copper d) All of these

41. Which of the following health issues can be caused by exposure to lead in E-waste?
a) Headaches
b) Neurological damage
c) Lung cancer
d) Diabetes

42. What component in E-waste is known to cause cancer in humans?
a) Beryllium
b) Gold
c) Silicon
d) Tin

43. How can E-waste affect groundwater?
a) By increasing water table levels
b) By leaching toxic substances into it
c) By improving water quality
d) By reducing water hardness

44. What health risk is associated with exposure to cadmium in E-waste?
a) Skin irritation
b) Bone damage
c) Kidney damage
d) Hair loss

45. Which organization provides guidelines for E-waste management?
a) WHO
b) EPA
c) UNICEF
d) NASA

46. What percentage of E-waste is recycled globally according to recent estimates?
a) 10%
b) 20%
c) 50%
d) 70%

47. What is the primary reason for the low recycling rate of E-waste?
a) Lack of awareness
b) High cost of recycling
c) Lack of technology
d) All of these

48. Which toxic element in E-waste is known to affect the human nervous system?
a) Copper
b) Lead
c) Iron
d) Zinc

49. What is an extended producer responsibility (EPR) program?
a) A consumer initiative for waste reduction
b) A government program for waste management
c) A policy approach where producer are responsible for disposal
d) A recycling facility initiative

50. Which of the following is NOT a common method for E-waste collection?
a) Municipal recycling programs
b) Landfill disposal
c) Manufacturer take-back programs
d) Non profit donation centers

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CBCS SCHEME

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BBOK407

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Biology for Engineers

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

			M	L	C
		Module – 1			
Q.1	**a.**	What are Nucleic acids? Mention its properties and functions.	**10**	**L2**	**CO1**
	b.	Write a short note on all the four types of stem cells.	**10**	**L2**	**CO1**
		OR			
Q.2	**a.**	Explain the similarities and differences between plant and animal cell.	**10**	**L2**	**CO1**
	b.	Explain the properties and functions of hormones.	**10**	**L2**	**CO1**
		Module – 2			
Q.3	**a.**	Explain the application of carbohydrates as cellulose based water filters, mention its advantages.	**10**	**L2**	**CO2**
	b.	Write short note on Meat analogue and Plant protein as food.	**10**	**L2**	**CO2**
		OR			
Q.4	**a.**	Explain the DNA vaccine for rabies.	**10**	**L2**	**CO2**
	b.	Write short note on PLA as bioplastic.	**10**	**L2**	**CO1**
		Module – 3			
Q.5	**a.**	Explain eye as a camera system.	**10**	**L3**	**CO2**
	b.	Describe the architecture of Lungs and gas exchange mechanism.	**10**	**L2**	**CO2**
		OR			
Q.6	**a.**	Explain the Kidney as filtration system.	**10**	**L3**	**CO2**
	b.	Write a short note on Chronic Obstructive Pulmonary Disease (COPD).	**10**	**L2**	**CO2**
		Module – 4			
Q.7	**a.**	Write a short note on : (i) Lotus Leaf effect (ii) Shark skin	**10**	**L1**	**CO3**
	b.	Illustrate the HBO's and PFC's as human blood substituents.	**10**	**L3**	**CO3**
		OR			
Q.8	**a.**	Write a short note on : (i) Photovoltaic cells (ii) Bionic leaf	**10**	**L1**	**CO3**
	b.	Describe the engineering applications of GPS and Velcro technology.	**10**	**L3**	**CO3**
		Module – 5			
Q.9	**a.**	Analyze the bio-engineering solutions for muscular dystrophy and osteoporosis.	**10**	**L4**	**CO4**
	b.	Write a short note on self healing bio-concrete.	**10**	**L2**	**CO4**
		OR			
Q.10	**a.**	Examine the bioimaging and artificial intelligence for disease diagnosis.	**10**	**L4**	**CO4**
	b.	Explain the process of biomining via microbial surface adsorption.	**10**	**L2**	**CO4**

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CBCS SCHEME

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21CV53

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Design of RC Structural Elements

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS456/ 2000 and SP 16 is permitted.
3. Assume any missing data.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain working Stress Method and also differentiate between working Stress Method and Limit State method. **(10 Marks)**

b. Explain the stress block parameters with a neat sketches for a rectangular RC section. **(10 Marks)**

OR

2 a. Briefly explain the step by step procedure for short term deflection and long term deflection. **(10 Marks)**

b. Explain the term balanced, under reinforced and over – reinforced section with neat sketch. **(10 Marks)**

Module-2

3 a. List the situations which require the adoption of doubly reinforced beam. **(06 Marks)**

b. A RCC beam of section 300 mm × 500 mm is reinforced with 4 bars of 16 mm diameter with an effective cover of 50 mm. The beam is simply supported over a span of 5 m. Find the maximum permissible UDL(including self weight) on the beam. Use M20 grade concrete and Fe500 grade steel. **(14 Marks)**

OR

4 a. A rectangular beam 230 mm wide and 535 mm effective depth is subjected to a bending moment of 88.5 KN-m at working loads. Find the steel arc required. Use M 15 grade concrete and Fe415 grade steel. **(10 Marks)**

b. A Tee – beam of effective flange width 1500 mm thickness of slab 100 mm, width of rib 300 mm and effective depth 560 mm is reinforced with 4 No's of 25 mm diameter bars. Calculate the factored moment of resistance. Use M 20 grade concrete and Fe415 grade steel. **(10 Marks)**

Module-3

5 A rectangular beam is simply supported on 230 mm thick wall with a clear span of 6 m. The beam is to have width 300 mm. The super imposed load is 12 KN/m. Design beam for flexure and shear. Check for deflection and sketch the details of reinforcement. Use M20 grade concrete and Fe415 grade steel. **(20Marks)**

OR

6 A Rectangular beam of size 250 mm × 600 mm of effective simply supported span of 7m has to support service load of 26.25 KN.m excluding self weight. The effective cover is 50mm. Design the beam for flexure and shear sketch the reinforcement details. Use M20 grade concrete and Fe415 grade steel. Use $f_{sc} = 352$ N/mm^2. **(20 Marks)**

Module-4

7 Design a reinforced concrete slab for a room of clear dimension 4m × 5m. The slab is supported all around on walls of width 300 mm. The slab has to carry a live load of 4 KN/m^2 and floor finish 1 KN/ m^2. Use M20 grade concrete and Fe415 grade steel. Assume all corners are held down, check section for shear & deflection. Sketch the details fo reinforcement. **(20 Marks)**

OR

8 Design a dog legged stair for an office building in a room measuring 2.8m x 5.8m, clear vertical distance between the floors is 3.6m, width of flight is to be 1.25 m. Allow a live load of 3 KN/ m^2. Sketch the details of reinforcement of one flight. Use M20 grade concrete and Fe415 grade steel. Assume the stairs are supported on 230mm walls at the end of outer edges of landing slabs. **(20 Marks)**

Module-5

9 a. Design the reinforcement for a short axially loaded square column of size 300mm × 300mm to support a load of 1000 KN. Use M20 grade concrete and Fe415 grade steel. **(10 Marks)**

b. A column of size 300 mm x 400mm has effective length of 3.6m and is subjected to P_u = 1100 KN and M_u = 150 KN – m about major axis. Design the column using M25 concrete and Fe415 steel. Assume effective cover of 60mm and provide steel on two sides only. **(10 Marks)**

OR

10 Design a square footing for short axially loaded column of size 300mm x 300mm carrying 600 KN load. Use M20 concrete and Fe415 grade steel. SBC of soil is 180KN/ m^2 sketch the details of reinforcement. **(20Marks)**

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CBCS SCHEME

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Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Solid Waste Management

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Briefly, discuss the policies and Legislative framework of solid waste management.	**10**	**L2**	**CO1**
	b.	Briefly explain the classification in solid waste management.	**10**	**L2**	**CO1**
		OR			
Q.2	**a.**	Discuss the Role of stakeholders in solid waste management.	**10**	**L2**	**CO2**
	b.	Discuss the need of solid waste management and explain the concept of 3R.	**10**	**L2**	**CO2**
		Module – 2			
Q.3	**a.**	Explain the various factors affecting the solid waste generation.	**10**	**L2**	**CO2**
	b.	Briefly, explain the physical properties of municipal solid waste.	**10**	**L2**	**CO2**
		OR			
Q.4	**a.**	Briefly, explain the different methods to estimate the quantity of waste generated.	**10**	**L2**	**CO2**
	b.	Briefly, explain the chemical and Biological properties of solid waste.	**10**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	Distinguish between Haulid container system and stationary container system with a schematic diagram.	**10**	**L2**	**CO2**
	b.	What are transfer stations? Briefly explain any two types of Transfer station.	**10**	**L1**	**CO2**
		OR			
Q.6	**a.**	Briefly, discuss the types of solid waste collection services and outline the importance of onsite processing.	**10**	**L2**	**CO2**
	b.	Briefly explain the following : i) Collection vehicle ii) Types of storage containers.	**10**	**L2**	**CO2**
		Module – 4			
Q.7	**a.**	Define RDF. Explain the steps unvalued in RDF.	**10**	**L1**	**CO3**
	b.	What is comporting? Explain the Bangalore method of computing with neat sketch.	**10**	**L1**	**CO3**

		OR			
Q.8	**a.**	What are the factors to be considered while designing a land fill?	**10**	**L2**	**CO3**
	b.	What is incineration? Discuss the advantages and disadvantages of incineration?	**10**	**L2**	**CO5**
		Module – 5			
Q.9	**a.**	Briefly explain the effects and disposal methods of E-waste.	**10**	**L2**	**CO3**
	b.	Explain the effects and disposal of construction and demolition waste.	**10**	**L1**	**CO3**
		OR			
Q.10	**a.**	Explain the classification of Biomedical wastes.	**10**	**L1**	**CO3**
	b.	Explain the Life Cycle Assessment in waste management.	**10**	**L1**	**CO3**

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CBCS SCHEME

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21CV52

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Transportation Engineering

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define transportation engineering and explain its role in National Development. **(08 Marks)**

b. Explain the major road projects currently under progress in India. **(06 Marks)**

c. Four new roads P, Q, R and S are planned in a district. The data for these roods are given below table.

Road	Length (km)	Number of towns and villages served with population ranges				Total production in 1000 tonnes
		1001-2000	2001-5000	5000-10000	> 10000	
P	300	160	80	30	6	200
Q	400	200	90	60	8	270
R	500	240	110	70	1	315
S	500	248	112	73	1	355

Based on principle of maximum utility, find out the order of priority for these four roads. **(06 Marks)**

OR

2 a. What is the necessity of Highway Planning? Explain the various planning surveys to be conducted before finalising the alignment. **(10 Marks)**

b. What are the requirements of an ideal alignment? Explain the various engineering surveys to be conducted before finalising the alignment. **(10 Marks)**

Module-2

3 a. With neat sketch explain the cross-sectional elements of a pavement. **(12 Marks)**

b. A car moving with a speed of 80 kmph has to overtake another car moving at a speed of 64 kmph in the 2 lane one way highway. If the reaction time of driver is 2 seconds and acceleration of overtaking car is 0.95 m/s^2, calculate safe OSD. **(08 Marks)**

OR

4 a. Calculate the Extra widening required for a 2-lane national highway at a horizontal curve of 300 m radius, considering a wheel base of 8 m and a design speed of 100 kmph. **(04 Marks)**

b. A valley cure is formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of valley curve to fulfill both comfort condition and head light sight distance requirements for a design speed of 80 kmph. Assume allowable rate of change of centrifugal acceleration C = 0.6 m/s^3. **(08 Marks)**

c. Differentiate between Flexible and Rigid Pavements. **(08 Marks)**

Module-3

5 a. Explain the desirable properties of aggregates along with the tests conducted to measure the same. **(08 Marks)**

b. Explain the California Bearing Ratio Test with neat figure. **(12 Marks)**

OR

6 a. Explain the applications of different types of viscosity grade Bitumen. **(08 Marks)**

b. Explain the material specifications, construction procedure and quality control of cement concrete pavement layer. **(12 Marks)**

Module-4

7 a. Explain hydrological and hydraulic analysis procedure used in the design of surface drainage system. **(10 Marks)**

b. Briefly explain the various methods used in highway economic analysis. **(10 Marks)**

OR

8 a. With a neat sketch explain different methods of providing sub-surface drainage system. **(12 Marks)**

b. Write a note on BOT, BOD, BOOT, BOLT, DBFO, HAM, LDO and OMT. **(08 Marks)**

Module-5

9 a. Explain the causes and measures to reduce road accidents. **(04 Marks)**

b. With neat sketch, mention the requirements of an ideal permanent way. **(08 Marks)**

c. With neat figure briefly explain the layout of an airport. **(08 Marks)**

OR

10 a. Calculate the number of sleepers required for constructing a BG track of length 1050 m with sleeper density of M + 5. **(04 Marks)**

b. The length of runway under standard conditions is 2000 m. The elevation of airport site is 300 m. Its reference temperature is 33.05°C. If the runway is to be constructed with an effective gradient of 0.25%, calculate the corrected runway length. **(08 Marks)**

c. Briefly explain how the direction of runway is determined using windrose diagram. **(08 Marks)**

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21CV53

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Design of RC Structural Elements

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS456/ 2000 and SP 16 is permitted.
3. Assume any missing data.

Module-1

1 a. Explain working Stress Method and also differentiate between working Stress Method and Limit State method. **(10 Marks)**

b. Explain the stress block parameters with a neat sketches for a rectangular RC section. **(10 Marks)**

OR

2 a. Briefly explain the step by step procedure for short term deflection and long term deflection. **(10 Marks)**

b. Explain the term balanced, under reinforced and over – reinforced section with neat sketch. **(10 Marks)**

Module-2

3 a. List the situations which require the adoption of doubly reinforced beam. **(06 Marks)**

b. A RCC beam of section 300 mm × 500 mm is reinforced with 4 bars of 16 mm diameter with an effective cover of 50 mm. The beam is simply supported over a span of 5 m. Find the maximum permissible UDL(including self weight) on the beam. Use M20 grade concrete and Fe500 grade steel. **(14 Marks)**

OR

4 a. A rectangular beam 230 mm wide and 535 mm effective depth is subjected to a bending moment of 88.5 KN-m at working loads. Find the steel arc required. Use M 15 grade concrete and Fe415 grade steel. **(10 Marks)**

b. A Tee – beam of effective flange width 1500 mm thickness of slab 100 mm, width of rib 300 mm and effective depth 560 mm is reinforced with 4 No's of 25 mm diameter bars. Calculate the factored moment of resistance. Use M 20 grade concrete and Fe415 grade steel. **(10 Marks)**

Module-3

5 A rectangular beam is simply supported on 230 mm thick wall with a clear span of 6 m. The beam is to have width 300 mm. The super imposed load is 12 KN/m. Design beam for flexure and shear. Check for deflection and sketch the details of reinforcement. Use M20 grade concrete and Fe415 grade steel. **(20Marks)**

OR

6 A Rectangular beam of size 250 mm × 600 mm of effective simply supported span of 7m has to support service load of 26.25 KN.m excluding self weight. The effective cover is 50mm. Design the beam for flexure and shear sketch the reinforcement details. Use M20 grade concrete and Fe415 grade steel. Use $f_{sc} = 352$ N/mm^2. **(20 Marks)**

Module-4

7 Design a reinforced concrete slab for a room of clear dimension 4m × 5m. The slab is supported all around on walls of width 300 mm. The slab has to carry a live load of 4 KN/m^2 and floor finish 1 KN/ m^2. Use M20 grade concrete and Fe415 grade steel. Assume all corners are held down, check section for shear & deflection. Sketch the details fo reinforcement. **(20 Marks)**

OR

8 Design a dog legged stair for an office building in a room measuring 2.8m x 5.8m, clear vertical distance between the floors is 3.6m, width of flight is to be 1.25 m. Allow a live load of 3 KN/ m^2. Sketch the details of reinforcement of one flight. Use M20 grade concrete and Fe415 grade steel. Assume the stairs are supported on 230mm walls at the end of outer edges of landing slabs. **(20 Marks)**

Module-5

9 a. Design the reinforcement for a short axially loaded square column of size 300mm × 300mm to support a load of 1000 KN. Use M20 grade concrete and Fe415 grade steel. **(10 Marks)**

b. A column of size 300 mm x 400mm has effective length of 3.6m and is subjected to P_u = 1100 KN and M_u = 150 KN – m about major axis. Design the column using M25 concrete and Fe415 steel. Assume effective cover of 60mm and provide steel on two sides only. **(10 Marks)**

OR

10 Design a square footing for short axially loaded column of size 300mm x 300mm carrying 600 KN load. Use M20 concrete and Fe415 grade steel. SBC of soil is 180KN/ m^2 sketch the details of reinforcement. **(20Marks)**

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21CV54

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Geotechnical Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With the help of 3-phase diagram explain (i) Bulk Density (ii) Voids ratio (iii) Degree of saturation (iv) Water content. **(06 Marks)**

b. With usual notation, derive the relationship $\gamma_d = \frac{(1-\eta_a)G.\gamma_w}{1+WG}$. **(06 Marks)**

c. A soil sample has a porosity of 40%. The specific gravity of solids is 2.70. Calculate (i) Voids ratio (ii) Dry density (iii) Unit weight if the soil is 50% saturated and (iv) Unit weight if the soil is completely saturated. **(08 Marks)**

OR

2 a. Following are the results of the liquid limit test on clay sample whose natural water content is 60% and plastic limit 22%.

Number of Blows (N)	34	22	19	12
Water Content (%)	44.6	49.4	51.4	55.6

Plot the flow curve and obtain (i) Liquid limit (ii) Plasticity Index (iii) Flow index (iv) Consistency Index. **(08 Marks)**

b. Explain with the help of particle size distribution curves the following type soils : (i) Well Graded soil (ii) Poorly graded soil (iii) Uniformly graded soil. **(06 Marks)**

c. With a neat sketch explain Plasticity Chart and its use in classifying fine grained soils. **(06 Marks)**

Module-2

3 a. Derive an expression for the determination of coefficient of permeability by Falling Head method. **(06 Marks)**

b. Discuss the factors affecting the permeability of soil? **(06 Marks)**

c. The following data refers to the falling head permeability tests performed of two different soils.
Areas of sample = 2800 mm^2 ; Area of stand pipe = 400 mm^2 ; Sample Height = 50 mm ; h_1 = 1000 mm ; h_2 = 200 mm .
Time required for fall of water head in stand pipe for
Sample 'A' = 500 seconds
Sample 'B' = 15 seconds
Determine permeability for both samples and also find permeability along horizontal and vertical to bedding planes. **(08 Marks)**

OR

4 a. Explain the following terms :
(i) Total stress
(ii) Neutral stress
(iii) Effective stress **(06 Marks)**

b. Explain briefly Quick Sand Phenomena. **(06 Marks)**

c. The water table in a certain area is at a depth of 4 m below the ground surface. To a depth of 12 m, the soil consists of very fine sand having an average voids ratio of 0.7. Above the water table the sand has an average degree of saturation of 50%. Calculate the effective pressure on a horizontal plane at a depth 10 m below the ground surface. What will be the increase in the effective pressure if the soil gets saturated by capillary upto a height of 1 m above the water table? G = 2.65. **(08 Marks)**

Module-3

5 a. Differentiate between Standard Proctor test and Modified Proctor test. **(06 Marks)**

b. List and explain briefly various types of field compaction equipments. **(06 Marks)**

c. A standard proctor compaction test conducted on a soil yielded the following results:

Bulk Density (KN/m^3)	18	19	19.6	20.45	21.0	20.50	20.1
Water Content (%)	9.6	11.0	12.5	14.0	16.0	18.0	19.5

If G = 2.70 , find the MDD and OMC by plotting the compaction curve. Also plot 100% and 80% saturation line. **(08 Marks)**

OR

6 a. In a consolidation test the voids ratio of soil sample decreases from 1.20 to 1.10 when the pressure is increased from 160 to 320 KN/m^2. Calculate the coefficient of consolidation if the coefficient of permeability is 8×10^{-7} mm/sec. **(06 Marks)**

b. Explain the Casagrande's method of determination of pre-consolidation. **(06 Marks)**

c. A saturated soil of 5 m thick lies above an impervious below a pervious stratum if it has a compression index of 0.25 and k is 3.2×10^{-10} m/sec. Its void ratio at a stress of 147 KN/m^2 is 1.9. Calculate (i) the change in voids ratio due to increase of stress to 190 KN/m^2 (ii) Coefficient of volume compressibility (iii) Coefficient of consolidation (iv) Time required for 50% consolidation. **(08 Marks)**

Module-4

7 a. Explain Mohr's – Coulomb's shear strength theory. **(06 Marks)**

b. Explain : (i) Sensitivity (ii) Thixotropy **(06 Marks)**

c. A direct shear test on sand (C = 0) gave a failure shear stress of 70 KN/m^2 when the normal load was 200 KN/m^2. Draw the Mohr's circle and Mohr's envelop and find the principal stresses at failure and the orientation of the principal planes. **(08 Marks)**

OR

8 a. A cylindrical specimen of saturated clay, 4 cm in diameter and 9 cm in overall length is tested in an unconfined compression tester. The specimen has coned ends and its length between the apices of cones is 8 cm. Find the unconfined compressive strength of clay, if the specimen fails under an axial load of 46.5 N. The change in the length of specimen at failure is 1 cm. **(06 Marks)**

b. Explain briefly with a neat sketch unconfined compression test. **(06 Marks)**

c. Two samples of a soil were tested in a triaxial machine the all round pressure maintained for the first sample was 200 KN/m^2 and failure occurred at an additional axial stress of 770 KN/m^2. For the second sample, these values were 500 KN/m^2 and 1370 KN/m^2 respectively. Find C and ϕ for the soil. **(08 Marks)**

Module-5

9 a. Explain briefly Terzaghi's bearing capacity theory. **(06 Marks)**

b. A square footing 2.5 m by 2.5 m is built in a homogeneous bed of sand of unit weight 20 KN/m^3 and having an angle of shearing resistance of 36°. The depth of the base of footing is 1.5 m below the ground surface. Calculate the safe load that can be carried by a footing with a F.O.S of 3 against complete shear failure. Use Terzaghi's analysis [$N_c = 65.4$; $N_q = 49.4$ and $N_\gamma = 54.0$] **(06 Marks)**

c. A strip footing 2 m wide carries a load intensity of 400 KN/m^2 at a depth of 1.2 m in sand. The saturated unit weight of sand is 19.5 KN/m^3 and unit weight above water table is 16.8 KN/m^3.The shear strength parameters are C = 0; $\phi = 35°$. Determine the factor of safety with respect to shear failure for the following cases of location of water table :
(i) Water table is 4 m below G.L.
(ii) Water table at the ground level.
[For $\phi = 35°$; $N_q = 41.4$; and $N\gamma = 42.4$] **(08 Marks)**

OR

10 a. A layer of clay 8 m thick underlies a proposed new building. The existing overburden pressure at the centre of clay layer is 300 KN/m^2 and the load due to construction of new building increases by 150 KN/m^2. The liquid limit of the soil is 65%, water content is 50% and specific gravity is 2.65. Estimate the consolidation settlement. **(08 Marks)**

b. Estimate the immediate settlement of a concrete footing 1 m × 1.5 m in size. It is founded at a depth of 1 m in silty soil, whose compression modulus is 9000 KN/m^2 , footing is expected to transmit unit pressure of 200 KN/m^2. Assume $I_F = 1.06$; $\mu = 0.3$. **(06 Marks)**

c. Explain briefly :
(i) Total settlement (ii) Immediate settlement (iii) Consolidation settlement **(06 Marks)**

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21RMI56

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Research Methodology and Intellectual Property Rights

Time: 3 hrs. Max. Marks: 100

Note : ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Describe the meaning of Research and the objectives of Engineering Research. **(10 Marks)**
b. Explain in brief the different types of Engineering Research. **(10 Marks)**

OR

2 a. In detail, explain the ethics in Engineering Research practice. **(10 Marks)**
b. Explain in brief the different types of Research Misconduct. **(10 Marks)**

Module-2

3 a. Explain briefly the bibliographic databases. **(10 Marks)**
b. Write a short note on :
i) Conceptualizing Research.
ii) Reading a Datasheet. **(10 Marks)**

OR

4 a. Explain the impact of titles and keywords on citation. **(10 Marks)**
b. Explain any two styles for citation. **(10 Marks)**

Module-3

5 a. Explain the role of Intellectual Property in the economic and cultural development of the society. **(10 Marks)**
b. Describe Patents and explain the conditions for obtaining a patent protection. **(10 Marks)**

OR

6 a. Briefly describe the national bodies dealing with Patent Affairs. **(10 Marks)**
b. Explain the different types of Patent Applications. **(10 Marks)**

Module-4

7 a. Briefly explain :
i) Classes of copyrights ii) Ownership of copyrights. **(10 Marks)**
b. Explain how copyrights can be transfer to a Publisher. **(10 Marks)**

OR

8 a. Describe trademark and write a note on eligibility criteria for trademark and designation of Trademark symbols. **(10 Marks)**
b. Explain the famous case Law between COCA – COLA company and BISLERI International Pvt. Ltd. **(10 Marks)**

Module-5

9 a. Describe Industrial design and explain the acts and laws to govern Industrial designs. **(10 Marks)**

b. Explain the famous case law : Apple INC. V/S Samsung Electronics Co. **(10 Marks)**

OR

10 a. Explain the procedure for GI Registration. **(10 Marks)**

b. Explain the case study of Curcuma (Turmeric) Plant. **(10 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

BCV601

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Design of RCC Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS456:2000, SP- 16 is permitted
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Compare Working Stree method and limit state method of design.	08	L2	CO1
	b.	Explain the stress block parameters with a neat sketch and derive the expression	12	L2	CO1
		OR			
Q.2	a.	Explain the terms: i) under reinforced section ii) balanced section ii) Over reinforced section	06	L2	CO1
	b.	A simply supported beam has a rectangular section and carries a uniformly distributed load of 20KN/m over a clear span of 5m. The cross – section is 300mm x 650mm and is reinforced with 4 numbers of 20mm diameter bar. Assume cover = 25mm and bearing = 300mm. Assuming M20 grade concrete and Fe415 steel, compute short and long term deflection of the beam.	14	L3	CO1
		Module – 2			
Q.3		Determine the moment of resistance of T section having the following section properties: Width of flange = 2500mm, Depth of flange =150mm, Width of rib = 300mm, Effective depth = 800mm, Area of steel = 8 bars of 25 mm diameter. Use M20 concrete and Fe415 HYSD bar.	20	L3	CO2
		OR			
Q.4		A doubly reinforced concrete beam having a rectangular section 250mm width and 540mm overall depth is reinforced with a 2 bars of 12mm diameter in the compression side and 4bars of 20mm diameter in the tension side. The effective cover to bars is 40mm. Using M20 grade concrete and Fe415 HYSD bars, estimate the flexural strength of the section using IS456:2000 code recommendations.	20	L3	CO2
		Module – 3			
Q.5		Design a rectangular beam of section 230mm x 600mm of effective span 6m and effect cover for reinforcement = 50mm. Imposed load on the beam is 40KN/m. Use M20 concrete and Fe415 steel.	20	L4	CO2
		OR			
Q.6		Design a simply supported beam of span 5m carries a characteristic live load of 12 KN/m. Use M20 grade of concrete and Fe 415 steel.	20	L4	CO2
		Module – 4			
Q.7	a.	Explain one way and two way slab with examples.	04	L2	CO3,4
	b.	Design a slab over a room of internal dimension 4m x 5m on 230mm thick brick wall. All edges are simply supported (corner of the slab are held down). Use live load 3KN/m^2, floor finish 1KN/ m^2. Use M20 and Fe415. Apply check for deflection with the reinforcement details.	16	L4	CO3,4

		OR			
Q.8		Design a dog legged staircase for an office building in a room measuring 2.8m x 5.8m clear. Vertical distance between the floors is 3.6m. width of flight is 1.25 m. Allow a live load of 3KN/ m^2, sketch the reinforcement details. Use M20 and Fe415. Assume the stairsare supported on 230mm wall at the end of outer edges of landing slabs.	**20**	**L4**	**CO3,4**
		Module – 5			
Q.9		Design a square footing for a short axially loaded column of size 300mm x 300mm carrying 600 KN load. Use M20 concrete and Fe415 steel. SBC of soil is 180 KN/ m^2. Sketch the details of reinforcement.	**20**	**L4**	**CO1**
		OR			
Q.10		Design a isolated footing for a rectangular column of 300mm x 500mm supporting an axial load of 1000 KN factored. Assume SBC of soil as 1KN/ m^2. Use M20 and Fe415. Sketch the reinforcement and perform the necessary checks	**20**	**L4**	**CO3,4**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **BCV602**

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025

Irrigation Engineering And Hydraulic Structures

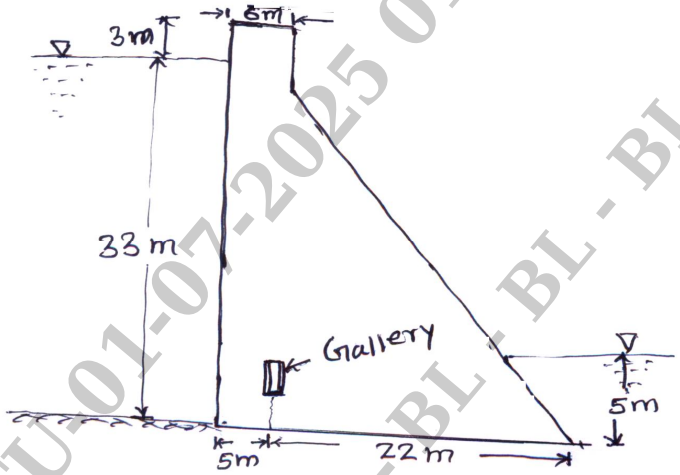
Time: 3 hrs. Max. Marks: 100

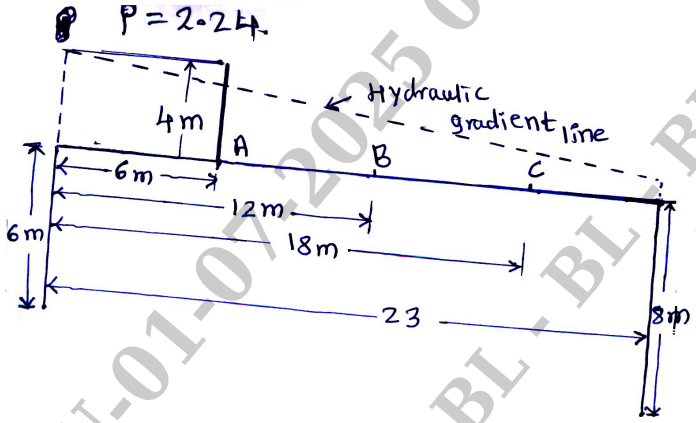
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Define irrigation. Write the benefits and ill effects of irrigation.	**10**	**L1**	**CO2**
	b.	The base period, intensity of irrigation and duty of various crops under a canal system are given in the table below. Find the reservoir capacity if the canal losses are 20% and the reservoir losses are 15%.	**10**	**L3**	**CO2**

Crop	Base Period (days)	Area (hect)	Duty (hect/cumecs)
Wheat	120	4800	1800
Sugar-Cane	360	5600	800
Cotton	200	2400	1400
Rice	120	3200	900
Vegetables	120	1400	700

		OR			
Q.2	**a.**	Write a note on i) Bandhara irrigation ii)Frequency of irrigation.	**10**	**L2**	**CO2**
	b.	Define duty, delta and Base period and derive relationship between them.	**05**	**L2**	**CO2**
	c.	A canal has a discharge of 20 cumecs. It irrigates 25,920 hectare of land during a base period of 120 days. Find the duty and delta of the canal.	**05**	**L3**	**CO3**
		Module – 2			
Q.3	**a.**	Define canal and explain classification of canal based on canal alignment.	**10**	**L2**	**CO3**
	b.	Design an irrigation channel in alluvial soil from following data using Lacey's Theory. Discharge = 18m^3/Sec. Lacey's silt factor = 1 Side slope = ½ :1.	**10**	**L4**	**CO3**
		OR			
Q.4	**a.**	Define reservoir and what are the investigations for the selection of a reservoir site.	**10**	**L1**	**CO3**
	b.	Design an irrigation channel on Kennedy's Theory to carry a discharge of 45 m^3/sec. Take N = 0.0225 and m=1.05. The channel has a bed slope of 1 in 5000. Assume Trail depth 2m, side slope 0.5:1.	**10**	**L4**	**CO3**

		Module – 3			
Q.5	**a.**	Define gravity dam and briefly explain the forces acting on a gravity dam.	**10**	**L2**	**CO1**
	b.	Determine the uplift force at the base of a gravity dam as shown in Fig.Q.5(b) for the following Three cases. a) No drains b) with drain and grout curtain at a distance of 5 m from U/S end c) Tension cracks upto 2 m from U/S end.  Fig. Q.5(b) Cross section of gravity dam	**10**	**L3**	**CO1**
		OR			
Q.6	**a.**	Write a note on : i) Practical Profile of a gravity dam ii) Drainage and inspection galleries.	**10**	**L2**	**CO1**
	b.	Following data were obtained from the stability analysis of concrete gravity dam : i) Total overturning moment about toe = 1.5 x 10^6 KN – m ii) Total resisting moment about toe = 2.5 x 10^6 KN – m iii) Total vertical force above base = 60,000 KN iv) Base width of the dam = 48 m v) Slope of D/S face = 0.8(H) : 1(V). Calculate the maximum and minimum vertical stress to which the foundation will be subjected to, what is the maximum principal stress at toe ? Assume there is no tail water.	**10**	**L4**	**CO1**
		Module – 4			
Q.7	**a.**	Explain the causes of failure of earthen dams.	**10**	**L2**	**CO1**
	b.	Briefly explain the methods of seepage control through foundation and body of earthen dams.	**10**	**L2**	**CO1**
		OR			
Q.8	**a.**	Define earthen dam and explain the design criteria for earthen dams.	**10**	**L2**	**CO1**
	b.	Write a note on : i) Ogee spillways ii) Stilling Basins.	**10**	**L2**	**CO1**

Module – 5					
Q.9	**a.**	Explain the types of diversion head works and causes of their failure.	**10**	**L2**	**CO1**
	b.	Fig.Q.9(b), shows the section of hydraulic structure founded on sand. Calculate the average hydraulic gradient. Also find the uplift pressure at point 6,12 and 18 m from the U/S ends of the floor and find the thickness of the floor at these points taking P = 2.24.  Fig. Q.9(b) Hydraulic Structure	**10**	**L3**	**CO1**
OR					
Q.10	**a.**	Describe with neat sketches, the working of a silt excluders and silt ejectors.	**10**	**L2**	**CO1**
	b.	Explain the following : i) Draw a layout of headwork, label the component and describe the function of each component. ii) Explain the Lane's weighted creep theory.	**10**	**L2**	**CO1**

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CBCS SCHEME

BCV657D

USN ☐☐☐☐☐☐☐☐☐☐

Question Paper Version : A

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Quality Control and Quality Assurance

Time: 1 hr.] [Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. Who is known for the "Zero Defects" concept in Quality management?
   a) W. Edwards Deming b) Philip B. Crosby
   c) Joseph Juran d) Walter Showhart

2. What does "PDCA" in the PDCA cycle stands for?
   a) Plan, Develop , Control , Act b) Plan, Do, Check , Act
   c) Process , Design , Control , Audit d) Prevent , Detect , Correct , Apply

3. Which of the following is not a cost associated with quality?
   a) Prevention cost b) Appraised cost
   c) Inspection cost d) External failure cost

4. What is the main focus of Quality Assurance (QA)?
   a) Detecting and fixing defects b) Ensuring defects do not occur
   c) Reducing the cost of materials d) Speeding up production

5. Which tools is commonly used in Quality control to monitor process?
   a) Pareto chart b) Control chart c) Fish bone diagram d) Histogram

6. In Total Quality Management (TQM), customer satisfaction is achieved through :
   a) Lowering production costs
   b) Continuous improvement and employee involvement
   c) Eliminating the need for inspections
   d) Faster production time

7. Which of these is a reason for poor quality in construction?
a) Use of skilled labour
b) Adhering to international standards
c) Poor process design and lack of training
d) Proper material testing

8. What is the primary focus of Quality Engineering?
a) Managing customer complaints
b) Improving design and process reliability
c) Reducing worker wages
d) Eliminating the need for inspections

9. What is a key benefit of implementing a Quality Management System (QMS)?
a) Reduced need for raw materials
b) Improved customer satisfaction and product reliability
c) Eliminates competition
d) Avoids the need for process documentation

10. The key purpose of ISO 9001 certification is to :
a) Improve product pricing strategies
b) Provide a framework for consistent quality management
c) Eliminate all production defects
d) Ensure 100% inspection of products

11. Who developed the "14 points for Management" to improve quality and productivity?
a) Philip B. Crosby
b) Joseph Juran
c) W. Edwards Deming
d) Kaoru Ishikawa

12. What does the Cost of Quality (COQ) concept focus on?
a) The cost of hiring Quality Inspectors
b) The total cost incurred to prevent detect and correct defective products
c) The cost of raw materials in production
d) The total wages paid to quality control staff

13. Which of the following is not a key principle of TQM?
a) Customer focused approach
b) Continuous improvement
c) High defect tolerance
d) Employee involvement

14. What is "Quality Function Deployment" (QFD) used for?
a) Reducing production costs
b) Translating customer requirements into products features
c) Eliminating process inspections
d) Increasing production speed.

15. Which of the following best describes Benchmarking?
a) Comparing an organizations processes with the best industry practices
b) Reducing employee salaries to lower costs
c) Increasing production without considering quality
d) Avoiding competition in the industry

16. Which of the following is not a principle of the ISO 9001 : 2015 standard?
a) Customer focus
b) Process approach
c) Profit maximization
d) Continuous improvement

17. ISO 14000 is primarily focused on :
a) Financial management b) Environmental management
c) Reducing employee turnover d) Increasing production speed

18. Which of the following is not a type of bench marking?
a) Internal Benchmarking b) Competitive Benchmarking
c) Strategic Benchmarking d) Random Benchmarking

19. What type of waste does ISO 14000 aims to reduce?
a) Material waste b) Time waste c) Energy waste d) All of these

20. What is an important element of performance evaluation in Quality Management?
a) Customer satisfaction surveys b) Employee feed back
c) Financial analysis d) All of these

21. Which of the following NOT a measure of central tendency?
a) Mean b) Median c) Mode d) Standard deviation

22. What is the minimum number of specimens required for a concrete strength test as per IS 456 : 2000
a) 1 b) 2 c) 3 d) 5

23. Which of the following measure is used to determine variability in data?
a) Mean b) Median c) Range d) Mode

24. What is the recommended cube size for compressive strength testing of concrete?
a) 100 mm × 100 mm × 100 mm b) 150 mm × 150 mm × 150 mm
c) 200 mm × 200 mm × 200 mm d) 50 mm × 50 mm × 50 mm

25. In sampling , a subset of data takes from a population is called
a) Census b) Population c) Sample d) Central group

26. What is the main advantage of using Statistical Quality Control in construction?
a) It reduces the number of workers needed
b) It ensures complete elimination of defects
c) It helps in monitoring and controlling quality using statistical methods
d) It increases construction costs significantly

27. The acceptance criteria for concrete as per IS 456 : 2000 states that no individual test result should be less than
a) Characteristic strength b) (Characteristic strength – 3 MPa)
c) (Characteristic strength + 5 MPa) d) (Characteristic strength – 5 MPa)

28. As per IS 456: 2000, concrete should be tested at how many days to determine its characteristic strength?
a) 3 and 7 days b) 7 and 14 days c) 7 and 28 days d) 14 and 28 days

29. What is the primary purpose of control chats in Statistical Quality Control?
a) To increase project costs
b) To monitor variation in construction quality
c) To eliminate all defects permanently
d) To calculate the total cost of the project

30. In a normal distribution , approximately what percentage of data falls within ± 1 standard deviation if the mean.
a) 50 % b) 68 % c) 90 % d) 99 %

31. Which of the following is a major cause of errors in concrete construction?
a) Inadequate curing b) Use of high – quality materials
c) Proper mix design d) Accurate measurement of materials

32. As per IS 456 : 2000, what is the minimum frequency of testing cement for fineness?
a) Every 1000 bags b) Every 50 tonnes
c) Every batch received d) Once a year

33. Which is code provides guidelines for the acceptance and rejection of cement?
a) IS 456 b) IS 4031 c) IS 269 d) IS 383

34. The standard test for determining the compressive strength of cement is conducted at how many days.
a) 1, 3 and 7 days b) 3, 7 and 28 days c) 7, 14 and 21 days d) 14, 21 and 28 days

35. Which test is NOT commonly conducted on find aggregate (sand)?
a) Sieve analysis b) Water absorption test
c) Elongation index test d) Silt content test

36. According to IS 383, the maximum permissible silt content in fine aggregate for concrete is?
a) 2 % b) 5 % c) 10 % d) 15 %

37. As per IS 456 : 2000, the compressive strength of M20 grade concrete at 28 days should be atleast
a) 10 MPa b) 15 MPa c) 20 MPa d) 25 MPa

38. Which test is used to determine the workability of fresh concrete?
a) Compressive strength test b) Slump test
c) Soundness test d) Los Angeles abrasion test

39. The frequency of testing cement for setting time in construction project should be :
a) Once per 100 tonnes b) Once per 50 tonnes
c) Once per 10 tonnes d) Every batch received

40. Which of the following tests is NOT performed on steel reinforcement bars?
a) Tensile strength test b) Bend test
c) Impact test d) Soundness test

41. At which stage of construction is feasibility and viability of the project assessed?
a) Conceptual design b) Preliminary design
c) Detailed design d) Construction

42. Which quality assessment test is used to measure the surface hardness of concrete?
a) Ultrasonic Pulse Velocity (USPV) Test b) Slump Test
c) Rebound Hammer Test d) Compressive Strength Test

43. Which IS Code provides guidelines for NDT of concrete?
a) IS 456 b) IS 516 c) IS 13311 d) IS 1786

44. The Rebound Hammer Test gives unreliable results of the concrete surface is :
a) Dry and clean b) Smooth and flat c) Rough and wet d) Newly cast

45. The Ultrasonic Pulse Velocity (USPV) test is primarily used to assess :
a) Compressive strength of concrete b) Surface hardness
c) Density and homogeneity of concrete d) Water absorption on bricks

46. Which of the following factors affects USPV test results?
a) Concrete density b) Surface moisture
c) Reinforcement presence d) All of these

47. If USPV test results indicates velocity between 3 km/sec and 3.5 km/sec, the concrete quality is classified as :
a) Excellent b) Good c) Medium d) Doubtful

48. At which stage construction are the final quality checks and documentation completed?
a) Conceptual design b) Detailed design
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49. What is the minimum recommended age of concrete for conducting USPV test?
a) 3 days b) 7 days c) 14 days d) 28 days

50. According to IS 13311, what is the standard angle at which a rebound hammer should be held during testing?
a) 30º b) 45º c) 60º d) 90º

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CBCS SCHEME

BCV657D

USN ☐☐☐☐☐☐☐☐☐☐

Question Paper Version : B

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025

Quality Control and Quality Assurance

Time: 1 hr.] [Max. Marks: 50

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c) Financial analysis
d) All of these

* * * * *

CBCS SCHEME

BCV657D

USN

Question Paper Version : C

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025

Quality Control and Quality Assurance

Time: 1 hr.] [Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.
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3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
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1. Which of the following NOT a measure of central tendency?
a) Mean b) Median c) Mode d) Standard deviation

2. What is the minimum number of specimens required for a concrete strength test as per IS 456 : 2000
a) 1 b) 2 c) 3 d) 5

3. Which of the following measure is used to determine variability in data?
a) Mean b) Median c) Range d) Mode

4. What is the recommended cube size for compressive strength testing of concrete?
a) 100 mm × 100 mm × 100 mm b) 150 mm × 150 mm × 150 mm
c) 200 mm × 200 mm × 200 mm d) 50 mm × 50 mm × 50 mm

5. In sampling , a subset of data takes from a population is called
a) Census b) Population c) Sample d) Central group

6. What is the main advantage of using Statistical Quality Control in construction?
a) It reduces the number of workers needed
b) It ensures complete elimination of defects
c) It helps in monitoring and controlling quality using statistical methods
d) It increases construction costs significantly

7. The acceptance criteria for concrete as per IS 456 : 2000 states that no individual test result should be less than
a) Characteristic strength b) (Characteristic strength – 3 MPa)
c) (Characteristic strength + 5 MPa) d) (Characteristic strength – 5 MPa)

8. As per IS 456: 2000, concrete should be tested at how many days to determine its characteristic strength?
a) 3 and 7 days b) 7 and 14 days c) 7 and 28 days d) 14 and 28 days

9. What is the primary purpose of control chats in Statistical Quality Control?
a) To increase project costs
b) To monitor variation in construction quality
c) To eliminate all defects permanently
d) To calculate the total cost of the project

10. In a normal distribution , approximately what percentage of data falls within ± 1 standard deviation if the mean.
a) 50 % b) 68 % c) 90 % d) 99 %

11. At which stage of construction is feasibility and viability of the project assessed?
a) Conceptual design b) Preliminary design
c) Detailed design d) Construction

12. Which quality assessment test is used to measure the surface hardness of concrete?
a) Ultrasonic Pulse Velocity (USPV) Test b) Slump Test
c) Rebound Hammer Test d) Compressive Strength Test

13. Which IS Code provides guidelines for NDT of concrete?
a) IS 456 b) IS 516 c) IS 13311 d) IS 1786

14. The Rebound Hammer Test gives unreliable results of the concrete surface is :
a) Dry and clean b) Smooth and flat c) Rough and wet d) Newly cast

15. The Ultrasonic Pulse Velocity (USPV) test is primarily used to assess :
a) Compressive strength of concrete b) Surface hardness
c) Density and homogeneity of concrete d) Water absorption on bricks

16. Which of the following factors affects USPV test results?
a) Concrete density b) Surface moisture
c) Reinforcement presence d) All of these

17. If USPV test results indicates velocity between 3 km/sec and 3.5 km/sec, the concrete quality is classified as :
a) Excellent b) Good c) Medium d) Doubtful

18. At which stage construction are the final quality checks and documentation completed?
a) Conceptual design b) Detailed design
c) Handover d) Preliminary design

19. What is the minimum recommended age of concrete for conducting USPV test?
a) 3 days b) 7 days c) 14 days d) 28 days

20. According to IS 13311, what is the standard angle at which a rebound hammer should be held during testing?
a) 30º b) 45º c) 60º d) 90º

21. Which of the following is a major cause of errors in concrete construction?
a) Inadequate curing
b) Use of high – quality materials
c) Proper mix design
d) Accurate measurement of materials

22. As per IS 456 : 2000, what is the minimum frequency of testing cement for fineness?
a) Every 1000 bags
b) Every 50 tonnes
c) Every batch received
d) Once a year

23. Which is code provides guidelines for the acceptance and rejection of cement?
a) IS 456 b) IS 4031 c) IS 269 d) IS 383

24. The standard test for determining the compressive strength of cement is conducted at how many days.
a) 1, 3 and 7 days b) 3, 7 and 28 days c) 7, 14 and 21 days d) 14, 21 and 28 days

25. Which test is NOT commonly conducted on find aggregate (sand)?
a) Sieve analysis
b) Water absorption test
c) Elongation index test
d) Silt content test

26. According to IS 383, the maximum permissible silt content in fine aggregate for concrete is?
a) 2 % b) 5 % c) 10 % d) 15 %

27. As per IS 456 : 2000, the compressive strength of M20 grade concrete at 28 days should be atleast
a) 10 MPa b) 15 MPa c) 20 MPa d) 25 MPa

28. Which test is used to determine the workability of fresh concrete?
a) Compressive strength test
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29. The frequency of testing cement for setting time in construction project should be :
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30. Which of the following tests is NOT performed on steel reinforcement bars?
a) Tensile strength test
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31. Who developed the "14 points for Management" to improve quality and productivity?
a) Philip B. Crosby
b) Joseph Juran
c) W. Edwards Deming
d) Kaoru Ishikawa

32. What does the Cost of Quality (COQ) concept focus on?
a) The cost of hiring Quality Inspectors
b) The total cost incurred to prevent detect and correct defective products
c) The cost of raw materials in production
d) The total wages paid to quality control staff

33. Which of the following is not a key principle of TQM?
a) Customer focused approach
b) Continuous improvement
c) High defect tolerance
d) Employee involvement

34. What is “Quality Function Deployment” (QFD) used for?
a) Reducing production costs
b) Translating customer requirements into products features
c) Eliminating process inspections
d) Increasing production speed.

35. Which of the following best describes Benchmarking?
a) Comparing an organizations processes with the best industry practices
b) Reducing employee salaries to lower costs
c) Increasing production without considering quality
d) Avoiding competition in the industry

36. Which of the following is not a principle of the ISO 9001 : 2015 standard?
a) Customer focus b) Process approach
c) Profit maximization d) Continuous improvement

37. ISO 14000 is primarily focused on :
a) Financial management b) Environmental management
c) Reducing employee turnover d) Increasing production speed

38. Which of the following is not a type of bench marking?
a) Internal Benchmarking b) Competitive Benchmarking
c) Strategic Benchmarking d) Random Benchmarking

39. What type of waste does ISO 14000 aims to reduce?
a) Material waste b) Time waste c) Energy waste d) All of these

40. What is an important element of performance evaluation in Quality Management?
a) Customer satisfaction surveys b) Employee feed back
c) Financial analysis d) All of these

41. Who is known for the “Zero Defects” concept in Quality management?
a) W. Edwards Deming b) Philip B. Crosby
c) Joseph Juran d) Walter Showhart

42. What does “PDCA” in the PDCA cycle stands for?
a) Plan, Develop , Control , Act b) Plan, Do, Check , Act
c) Process , Design , Control , Audit d) Prevent , Detect , Correct , Apply

43. Which of the following is not a cost associated with quality?
a) Prevention cost b) Appraised cost
c) Inspection cost d) External failure cost

44. What is the main focus of Quality Assurance (QA)?
a) Detecting and fixing defects b) Ensuring defects do not occur
c) Reducing the cost of materials d) Speeding up production

45. Which tools is commonly used in Quality control to monitor process?
a) Pareto chart b) Control chart c) Fish bone diagram d) Histogram

46. In Total Quality Management (TQM), customer satisfaction is achieved through :
a) Lowering production costs
b) Continuous improvement and employee involvement
c) Eliminating the need for inspections
d) Faster production time

47. Which of these is a reason for poor quality in construction?
a) Use of skilled labour
b) Adhering to international standards
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d) Proper material testing

48. What is the primary focus of Quality Engineering?
a) Managing customer complaints
b) Improving design and process reliability
c) Reducing worker wages
d) Eliminating the need for inspections

49. What is a key benefit of implementing a Quality Management System (QMS)?
a) Reduced need for raw materials
b) Improved customer satisfaction and product reliability
c) Eliminates competition
d) Avoids the need for process documentation

50. The key purpose of ISO 9001 certification is to :
a) Improve product pricing strategies
b) Provide a framework for consistent quality management
c) Eliminate all production defects
d) Ensure 100% inspection of products

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CBCS SCHEME

BCV657D

USN ☐☐☐☐☐☐☐☐☐☐

Question Paper Version : D

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CBCS SCHEME

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21CV72

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Construction Technology for Substructures and Super Structures

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Write a note on Micro Tunnelling. **(10 Marks)**
b. Write a note on TBM. **(10 Marks)**

OR

2 a. What is bedding of conduits explain its significance. **(10 Marks)**
b. Explain different methods of compaction technology. **(10 Marks)**

Module-2

3 a. What is underwater drilling and blasting give one case study. **(10 Marks)**
b. Explain Jet grouting with a neat sketch. **(10 Marks)**

OR

4 a. What is the role of dewatering in shallow and deep excavation and list various method. **(10 Marks)**
b. Explain well point system with a neat sketch. **(10 Marks)**

Module-3

5 a. Write a note on operation and erection of R.M.C plant. **(10 Marks)**
b. Write a note on Concrete mix design. **(10 Marks)**

OR

6 a. Explain underwater concrete and its significance and also list the various methods used. **(10 Marks)**
b. Write a note on Self-Compacting Concrete. **(10 Marks)**

Module-4

7 a. Write a note on piles in land and marine structures. **(10 Marks)**
b. Explain initial and routine tests on piles as per codal specifications. **(10 Marks)**

OR

8 a. Write a note on pile driving by vibration and construction of micro piles. **(10 Marks)**
b. Write a note on Diaphragm walls. **(10 Marks)**

Module-5

9 a. What are cofferdams and explain the construction of a double wall cofferdam? **(10 Marks)**
b. State the uses of cofferdams and explain concrete wall movable cofferdams. **(10 Marks)**

OR

10 a. What are the differences between pneumatic and open caissons? **(10 Marks)**
b. Write a note on Well foundations. **(10 Marks)**

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21CV731

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2025
Advanced Design of RCC and Steel Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any TWO full questions, choosing ONE full question from each module.
2. Code to be allowed : i) IS800 : 2007 ii) SP6(1) iii) IS 456 :2000.

Module-1

1 Design a combined footing for two columns of size 300×300 mm and 400mm × 400mm subjected to 500 kN and 700 kN respectively. The C/C spacing between the columns is 3.5 m. The width of the footing is restricted to 1.5 m. Take SBC of the soil as 150 kN/m^2. Use M25 grade concrete and Fe 415 grade steel. Design slab and beam type combined footing. Also draw the sectional elevations. **(50 Marks)**

OR

2 Design a cantilever retaining wall to retain an earth embankment 4 m high above ground level. The density of earth is 18 kN/m^3 and its angle of response is 30° the embankment is horizontal at top. The SBC of soil is 200 kN/m^2, the coefficient of friction between soil and concrete is 0.5. Take top width of stem is 200 mm. Use M20 grade concrete and Fe 415 grade steel, also draw the cross sectional elevation and showing reinforcement details. **(50 Marks)**

Module-2

3 Design a roof truss shown in Fig Q3 with forces in each member along with its nature, also design end with gusset plate using black bolt of property class 4.6. Also design the support consisting of shoe angle and bearing plate by considering support reaction of 150 kN. Anchor bolts are subjected to an uplift of 15 kN at each support. M20 concrete is used at supports. Also draw the elevation of truss greater than half plan.

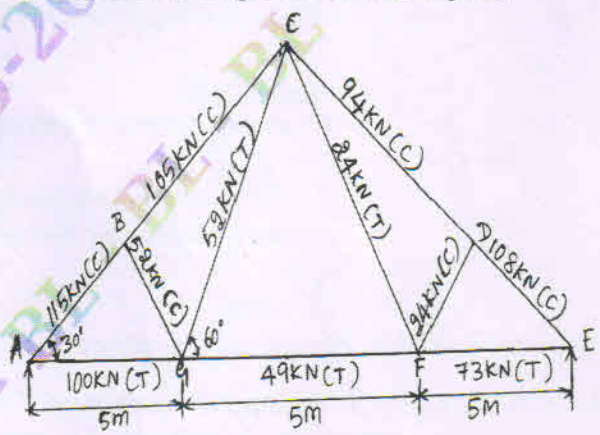

Fig Q3 **(50 Marks)**

Module-4

7 a. Explain the procedure for design of rigid pavement as per IRC 58-2002. **(10 Marks)**

b. Calculate the stresses at interior. Edge and corner regions of CC pavement using Westergaard's analysis. Use the following data:

Wheel load = 4100 kg

$E_c = 2.1 \times 10^5$ kg/cm^2

Pavement thickness = 20 cm

Poisson's ratio of concrete = 0.15

Modulus of subgrade reaction ; K = 2.5 kg/cm^3

Radius of contact area, a = 8.91 cm. **(10 Marks)**

OR

8 a. Determine the warping stress at interior, edge and corner regions in a 25 cm thick concrete-pavement with transverse joints at 11 m interval and longitudinal joints at 3.6 m, K = 6.9 kg/cm^3, t = 0.6°C per cm, slab thickness a = 15 cm, $e = 10 \times 10^{-6}$ per °C, $\mu = 0.15$, $E = 3 \times 10^5$ kg/cm^2. **(10 Marks)**

b. Explain the procedure for "design of Dowel bar" in rigid pavement as per IRC. **(10 Marks)**

Module-5

9 a. List the typical failures in rigid pavement. Explain any 3 of them. **(10 Marks)**

b. Write a short note on:

i) Properties of subgrade and its function

ii) Properties of concrete. **(10 Marks)**

OR

10 a. Explain different types of joints in rigid pavement, with the help of neat sketches. **(10 Marks)**

b. What are the necessity of functional evaluation in rigid pavement? Explain briefly the types of functional evaluation of rigid pavement. **(10 Marks)**

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CBCS SCHEME

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21CV753

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2025
Environmental Protection and Management

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain about the abatement of pollution and conservation of resources. **(10 Marks)**

b. Explain any five key principles of environmental management. **(10 Marks)**

OR

2 a. Discuss various drivers and barriers for sustainable development (any five in each) **(10 Marks)**

b. Explain the concept of environmental stewardship and steps taken in the stewardship process. **(10 Marks)**

Module-2

3 a. Explain any ten environmental quality objectives in managing the environment. **(10 Marks)**

b. Explain the following concepts as per the standards.
i) Concentration and mass standards
ii) Effluents and stream standards. **(10 Marks)**

OR

4 a. Explain in detail the environmental performance evolution and performance indicators. **(10 Marks)**

b. Explain the following concepts for maintaining environmental objectives in Industry.
i) Pollution control and pollution prevention
ii) Cleaner production and clean technology **(10 Marks)**

Module-3

5 a. Explain the basic elements of EMS. **(10 Marks)**

b. Explain ten components in a successful environmental management system. **(10 Marks)**

OR

6 a. What are the benefit of an ISO 14001 certification and barrier associated with EMS's? **(10 Marks)**

b. Explain the pollution prevention and continuous improvement with sketch and example. **(10 Marks)**

Module-4

7 a. Explain the environmental management system audit program as per ISO 19011 with flow diagram. **(10 Marks)**

b. Explain the seven principles of International Standard Organization auditing. **(10 Marks)**

OR

8 a. Explain the contents of environmental statement (Form V) **(10 Marks)**

b. Discuss the phases in waste minimization planning in an industry. **(10 Marks)**

Module-5

9 a. Explain the pollution prevention and control activities in tanning and textile industry. **(10 Marks)**

b. Explain the waste generation and environmental management in pulp and paper industry. **(10 Marks)**

OR

10 a. Explain the waste minimization measures in tannery sector. **(10 Marks)**

b. Explain the pollution prevention and control activities in electroplating industry. **(10 Marks)**

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