**M23BBIOK401**

Maharaja Education Trust (R), Mysuru
MAHARAJA INSTITUTE OF TECHNOLOGY MYSORE
An Autonomous Institute, affiliated Visvesvaraya Technological University, Belagavi Belawadi,
Srirangapatna Taluk, Mandya – 571 477
Approved by AICTE, New Delhi | Recognized by Govt. of Karnataka |



IV Semester B.E Semester End Examinations
MODEL QUESTION PAPER

Duration: 1 hr.**Max. Marks: 50**

Subject: BIOLOGY FOR ENGINEERS

SERIES A

Note: Answer all the questions, each question carries one mark.

SI No.	Questions	CO's
1	What is the basic structural and functional unit of life? a) Organ b) Tissue c) Cell d) Molecule	1
2	Proteins are synthesized in: a) Golgi apparatus b) Ribosomes c) Mitochondria d) Lysosomes	1
3	Carbohydrates are stored in the liver as: a) Starch b) Glycogen c) Glucose d) Sucrose	1
4	The cell membrane is primarily composed of: a) Proteins and carbohydrates b) Lipids and proteins c) DNA and RNA d) Enzymes and vitamins	1
5	The smallest unit of protein structure is: a) Amino acid b) Nucleotide c) Polysaccharide d) Lipid	1
6	Which molecule is responsible for carrying genetic information in cells? a) Proteins b) Carbohydrates c) DNA d) Lipids	1
7	What type of bond joins amino acids in proteins? a) Glycosidic bond b) Peptide bond c) Hydrogen bond d) Ionic bond	1
8	DNA is composed of units called: a) Amino acids b) Nucleotides c) Monosaccharides d) Lipids	1
9	Which molecule is produced during glycolysis? a) Oxygen b) Carbon dioxide c) Glucose d) Pyruvate	1
10	What is the primary function of enzymes in biological systems? a) Transport oxygen b) Regulate cell growth c) Catalyze chemical reactions d) Store genetic information	1
11	The function of the cytoskeleton is to: a) Store genetic material b) Provide structural support to the cell c) Regulate cell division d) Produce proteins	1
12	Which organelle is involved in cellular digestion? a) Lysosome b) Mitochondria c) Chloroplast d) Peroxisome	1
13	Enzymes act as: a) Hormones b) Structural components c) Catalysts d) Energy molecules	1
14	Lipids primarily function as: a) Enzymes b) Energy reserves c) Hormones d) Genetic material	1
15	Nucleic acids are responsible for: a) Storing genetic information b) Providing energy c) Catalyzing reactions d) Forming cell membranes	1
16	Which organelle is known as the "control center" of the cell? a) Nucleus b) Golgi apparatus c) Endoplasmic reticulum d) Lysosomes	1
17	Which organelle is responsible for energy production in cells? a) Nucleus b) Mitochondria c) Golgi apparatus d) Lysosomes	1
18	Which vitamin is essential for blood clotting? a) Vitamin A b) Vitamin D c) Vitamin K d) Vitamin E	1
19	Which organelle modifies and packages proteins? a) Ribosome b) Lysosome c) Golgi apparatus d) Endoplasmic reticulum	1
20	Which type of cell would most likely contain large amounts of smooth endoplasmic reticulum (ER)? a) Muscle cell b) Liver cell c) Nerve cell d) Red blood cell	1
21	Which biomolecule is used as a primary fuel source during cellular respiration? a) Nucleic acids b) Carbohydrates c) Lipids d) Proteins	2
22	What is the primary function of enzymes in food processing? a) Enhance flavor b) Aid in digestion c) Speed up biochemical reactions d) Store nutrients	2

23	Which vitamin is fat-soluble and important for vision? a) Vitamin A b) Vitamin B c) Vitamin C d) Vitamin K	2
24	Polyhydroxyalkanoates (PHA) are primarily used for: a) Biodegradable plastics b) Protein synthesis c) Hormone production d) Drug delivery	2
25	Which of the following biomolecules is primarily responsible for providing energy to the body? a) Proteins b) Lipids c) Carbohydrates d) Nucleic acids	2
26	Which lipid is commonly used as biodiesel? a) Cholesterol b) Saturated fat c) Unsaturated fat d) Vegetable oil	2
27	Which biomolecule is used in the formation of hair and nails? a) Carbohydrates b) Proteins c) Lipids d) Nucleic acids	2
28	The use of nucleic acids in vaccines is primarily to: a) Provide energy b) Act as a catalyst c) Store genetic information d) Aid in digestion	2
29	What is the role of lipids in insulating neurons? a) Transport messages b) Store energy c) Form the myelin sheath d) Synthesize proteins	2
30	Which natural polymer is a primary source of bioplastics: a) Cellulose b) Proteins c) Lipids d) Starch	2
31	The study of plant burrs has inspired which type of bioengineering product? a) Adhesives b) Water filters c) Bioplastics d) Solar panels	3
32	Biodegradable plastics are often inspired by which natural polymer? a) Cellulose b) Spider silk c) Chitin d) Keratin	3
33	The echolocation ability of bats inspired the development of: a) Sonar systems b) MRI scanners c) Drug delivery devices d) Artificial photosynthesis	3
34	The structure of bird wings has influenced: a) Aircraft aerodynamics b) Insulation materials c) Water purification systems d) Drug development	3
35	Spider silk inspires bioengineering materials for: a) High-strength composites b) Solar panels c) Waterproof fabrics d) Prosthetics	3
36	Which bioinspired material mimics the water-repellent surface of lotus leaves? a) Self-cleaning fabrics b) Antibacterial coatings c) Biodegradable plastics d) Adhesives	3
37	What principle inspired the development of self-healing materials? a) Blood clotting b) Cell division c) Photosynthesis d) Animal regeneration	3
38	The structure of honeycombs is applied in bioengineering for: a) Aircraft design b) Biodegradable plastics c) Artificial organs d) Drug delivery systems	3
39	Sharkskin's antibacterial surface property is mimicked for: a) Self-cleaning materials b) Lightweight fabrics c) Protective coatings d) Medical implants	3
40	Which animal's beak inspired the design of high-speed trains? a) Hummingbird b) Kingfisher c) Penguin d) Falcon	3
41	What is one key benefit of scaffolds in tissue engineering? a) Supporting tissue regeneration and growth b) Enhancing oxygen delivery c) Stabilizing artificial organs d) Synthesizing biofuels	4
42	Artificial photosynthesis is designed to: a) Convert sunlight into energy b) Replace damaged DNA c) Generate bioelectricity from bacteria d) Improve drug delivery mechanisms	4
43	Bioremediation refers to: a) Using microorganisms to clean environmental pollutants b) Developing sustainable plastics c) Enhancing photosynthesis for energy production d) Printing organs for transplantation	4
44	Which bioengineering technology is used to create artificial tissues for drug testing? a) Bioprinting b) Bioimaging c) Electrical tongue d) Bioremediation	4
45	AI-assisted imaging software in bioengineering improves: a) Accuracy of medical imaging b) Biodegradable plastic production c) Regeneration of damaged tissues d) Protein synthesis in cells	4
46	Bioimaging is primarily used for: a) Capturing images of the body's internal structures b) Monitoring environmental changes c) Printing tissues and organs d) Developing prosthetic devices	4
47	DNA origami is used for: a) Designing nanoscale structures for drug delivery b) Synthesis of artificial tissues c) Regulating immune responses d) Recycling biological waste	4
48	What is the role of bioconcrete in construction? a) Self-repairing cracks b) Reducing building costs c) Improving thermal resistance d) Generating electricity	4
49	Bioprinting technologies allow for: a) Manufacturing living tissues and organs b) Synthesizing proteins for medical use c) Producing energy-efficient materials d) Filtering water with microorganisms	4
50	Artificial intelligence in bioengineering is applied to: a) Diagnose diseases b) Design energy-efficient buildings c) Perform DNA sequencing d) Generate biofuels	4

ANSWER - A

1. c) Cell
2. b) Ribosomes
3. b) Glycogen
4. b) Lipids and proteins
5. a) Amino acid
6. c) DNA
7. b) Peptide bond
8. b) Nucleotides
9. d) Pyruvate
10. c) Catalyze chemical reactions
11. b) Provide structural support to the cell
12. a) Lysosome
13. c) Catalysts
14. b) Energy reserves
15. a) Storing genetic information
16. a) Nucleus
17. b) Mitochondria
18. c) Vitamin K
19. c) Golgi apparatus
20. b) Liver cell
21. b) Carbohydrates
22. c) Speed up biochemical reactions
23. a) Vitamin A
24. a) Biodegradable plastics
25. c) Carbohydrates
26. d) Vegetable oil
27. b) Proteins
28. c) Store genetic information to stimulate immune response
29. c) Form the myelin sheath
30. a) Cellulose
31. c) Bioplastics
32. a) Cellulose
33. a) Sonar systems
34. a) Aircraft aerodynamics
35. a) High-strength composites
36. a) Self-cleaning fabrics
37. a) Blood clotting
38. a) Aircraft design
39. c) Protective coatings
40. b) Kingfisher
41. a) Supporting tissue regeneration and growth
42. a) Convert sunlight into energy
43. a) Using microorganisms to clean environmental pollutants
44. a) Bioprinting
45. a) Accuracy of medical imaging
46. a) Capturing images of the body's internal structures
47. a) Designing nanoscale structures for drug delivery
48. a) Self-repairing cracks
49. a) Manufacturing living tissues and organs
50. c) Perform DNA sequencing

M23BCV402



IV Semester B.E Semester End Examinations

MODEL QP

JUNE /JULY 2025

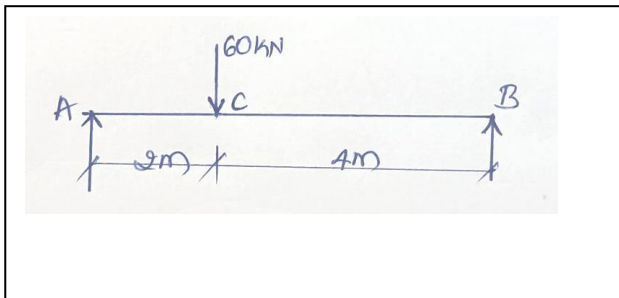
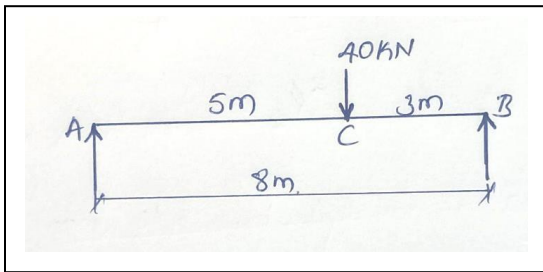
Analysis of Structures

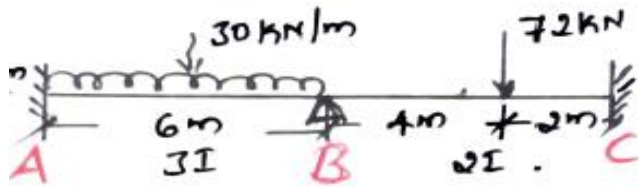
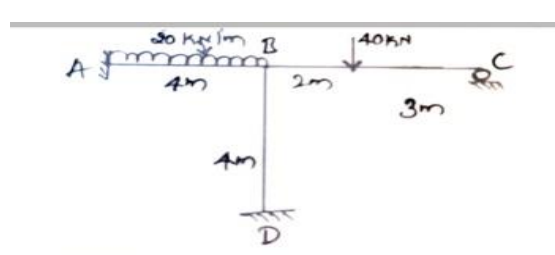
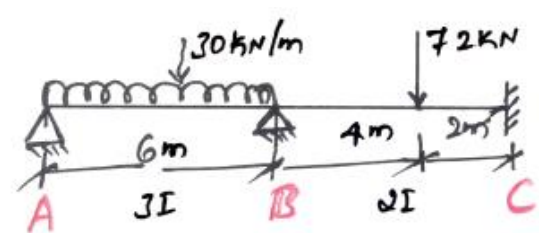
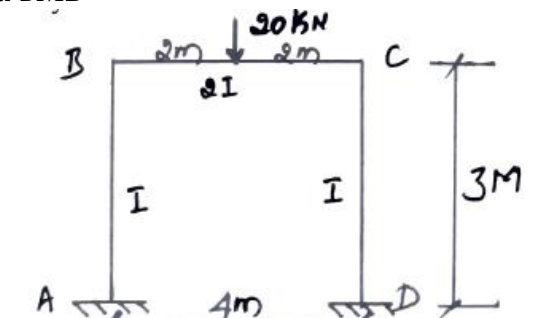
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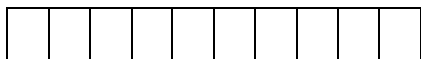
Max. Marks: 100

Answer five full questions choosing one complete question from each module.

Page 1 of 3

Module 2				
3 a)	Evaluate the maximum slope and deflection in cantilever beam, of span L and subjected to UDL over the entire span.	8	1	4
b)	Using moment-area method, find the slope at left support and deflection under the point load for the beam given. Take $EI = 12000$ KN-m ² 	12	2	4
OR				
4 a)	Evaluate maximum slope and deflection in a simply supported beam of span L, subjected to point load W at its mid-span.	8	1	4
b)	Using moment-area method, find the maximum deflection in a simply supported beam loaded as shown in figure. Take $EI = 9000$ kN-m ² . 	12	2	4
Module 3				
5 a)	A three hinged parabolic arch of span 24 m with central rise of 4 m, subjected to a pint load of 60 KN at crown point, find the reactions at supports and sketch the BMD.	8	2	5
b)	The suspension cable is supported at 2 points 25m apart, left support is 2.5m above the right support, the cable is loaded with the UDL of 10 KN/m. throughout the span. The maximum dip in the cable from the left support is 4m find the maximum and minimum tension in the cable.	12	2	5
OR				
6 a)	The suspension cable having supports at same level which is 30m apart and maximum dip of 3m. The cable is loaded with UDL of intensity 10 KN/m. find the maximum and minimum tension in the cable also finds the length of the cable.	8	2	5
b)	A three hinged parabolic arch of span 40m has abutment supports at un equal levels. A highest point of the arch is 4m above the left support. The arch is subjected to an UDL of 15 KN/m over the entire span. Find the normal thrust, radial shear and BM at a point 10m from right support. Right support is 5m below the left support.	12	2	5

Module 4				
7	Analyse the continuous beam shown by slope deflection method and draw SFD, BMD. support B is having 9mm sink consider $EI=2 \times 10^4 \text{ KN-M}^2$ 	20	3	5
OR				
8	Analyse the frame shown by slope deflection method and draw SFD and BMD 	20	3	5
Module 5				
9	Analyse the continuous beam shown by Moment Distribution method and draw SFD and BMD 	20	3	5
OR				
10	Analyse the frame shown by Moment Distribution method and draw SFD and BMD 	20	3	5



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IV Semester B.E Semester End Examinations

MODEL QP

JUNE /JULY 2025

Water Resources Engineering

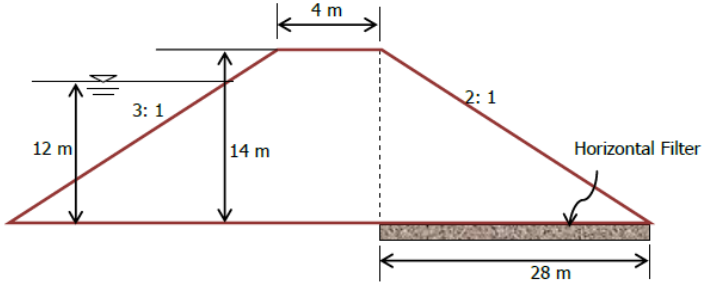
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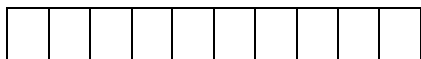
Max. Marks: 100

Answer five full questions choosing one complete question from each module.

Sl. No.	Questions	Marks	CO	RBT Level																																	
Module 1																																					
1 a)	Discuss the types of Rainfall with neat diagram, also mention the forms of Precipitation.	10	1	3																																	
b)	Examine the average precipitation by the Arithmetic average method and Thiessen polygon method from the following data. <table><tr><td>STN</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>TW</td><td>0.1</td><td>0.16</td><td>0.12</td><td>0.11</td><td>0.09</td><td>0.08</td><td>0.07</td><td>0.11</td><td>0.06</td><td>0.1</td></tr><tr><td>RF</td><td>132</td><td>114</td><td>162</td><td>138</td><td>207</td><td>156</td><td>135</td><td>158</td><td>168</td><td>150</td></tr></table>	STN	1	2	3	4	5	6	7	8	9	10	TW	0.1	0.16	0.12	0.11	0.09	0.08	0.07	0.11	0.06	0.1	RF	132	114	162	138	207	156	135	158	168	150	10	2	4
STN	1	2	3	4	5	6	7	8	9	10																											
TW	0.1	0.16	0.12	0.11	0.09	0.08	0.07	0.11	0.06	0.1																											
RF	132	114	162	138	207	156	135	158	168	150																											
OR																																					
2 a)	Discuss the factors affecting and control of Evaporation.	10	1	3																																	
b)	Given are the ordinates of 4 hour UH as below. Derive the ordinates of 12 hour UH for the same catchment. <table><tr><td>Time, Hrs</td><td>0</td><td>4</td><td>8</td><td>12</td><td>16</td><td>20</td><td>24</td><td>28</td><td>32</td><td>36</td><td>40</td><td>44</td></tr><tr><td>OUH of 4 Hrs</td><td>0</td><td>20</td><td>80</td><td>130</td><td>150</td><td>130</td><td>90</td><td>52</td><td>27</td><td>15</td><td>5</td><td>0</td></tr></table>	Time, Hrs	0	4	8	12	16	20	24	28	32	36	40	44	OUH of 4 Hrs	0	20	80	130	150	130	90	52	27	15	5	0	10	2	4							
Time, Hrs	0	4	8	12	16	20	24	28	32	36	40	44																									
OUH of 4 Hrs	0	20	80	130	150	130	90	52	27	15	5	0																									
Module 2																																					
3 a)	Discuss the advantages and disadvantages of Drip irrigation.	10	1	3																																	
b)	A loam soil as field capacity of 22% and wilting co-efficient of 10%. The dry unit weight of soil is 1.5 gm/cc. If the root zone depth is 70cm, determine the storage of the soil. Irrigation water is applied when moisture content falls to 14%. If the water application efficiency is 75%, determine the water depth required to be applied in the field.	10	2	4																																	
OR																																					
4 a)	Solve the equation, $\Delta = \frac{8.64 \times B}{D}$	10	1	3																																	

b)	A reservoir with live storage of 400 million cubic meter is available to irrigate an area of 40,000 hectares with 2 fillings each year. The crop season is 125 days. Examine the duty.	10	2	4																										
Module 3																														
5 a)	Discuss types of Canals.	10	3	3																										
b)	Design an irrigation canal in an alluvial soil according to Lacey's Silt theory for the following data- (i) Full Supply Discharge = 30 cumecs (ii) Lacey's Silt Factor = 1 (iii) Side slope of canal = 0.5 H : 1 V	10	4	4																										
OR																														
6 a)	Discuss Indian rivers & their floods and also mention the causes of drought.	10	3	3																										
b)	Design an irrigation canal by Kennedy's method to carry 50 cumecs of discharge. The channel is to be laid at a slope of 1 in 4000. The critical velocity ratio for the soil is 1.1. Use Kutter's rugosity coefficient as 0.023.	10	4	4																										
Module 4																														
7a)	Compare the types of Reservoirs and also discuss the criteria regarding selection of Reservoir site.	10	3	3																										
b)	The monthly yield of water from a catchment is given below. Examine the reservoir capacity if flow is drawn at uniform rate. <table><tr><td>Month</td><td>Jul</td><td>Aug</td><td>Sep</td><td>Oct</td><td>Nov</td><td>Dec</td><td>Jan</td><td>Feb</td><td>Mar</td><td>Apr</td><td>May</td><td>Jun</td></tr><tr><td>Inflow Volume, Mm³</td><td>7.7</td><td>2.8</td><td>2.52</td><td>2.24</td><td>1.96</td><td>1.68</td><td>1.4</td><td>2.1</td><td>2.8</td><td>8.4</td><td>11.9</td><td>11.9</td></tr></table>	Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Inflow Volume, Mm ³	7.7	2.8	2.52	2.24	1.96	1.68	1.4	2.1	2.8	8.4	11.9	11.9	10	4	5
Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun																		
Inflow Volume, Mm ³	7.7	2.8	2.52	2.24	1.96	1.68	1.4	2.1	2.8	8.4	11.9	11.9																		
OR																														
8 a)	Discuss the types of Dams with advantages and disadvantages.	10	3	3																										
b)	The monthly yield of water from a catchment is given below. Examine the reservoir capacity if flow is drawn at uniform rate. <table><tr><td>Month</td><td>Jan</td><td>Feb</td><td>Mar</td><td>Apr</td><td>May</td><td>Jun</td><td>Jul</td><td>Aug</td><td>Sep</td><td>Oct</td><td>Nov</td><td>Dec</td></tr><tr><td>Inflow Volume, Mm³</td><td>1.4</td><td>2.1</td><td>2.8</td><td>8.4</td><td>11.9</td><td>11.9</td><td>7.7</td><td>2.8</td><td>2.52</td><td>2.24</td><td>1.96</td><td>1.68</td></tr></table>	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Inflow Volume, Mm ³	1.4	2.1	2.8	8.4	11.9	11.9	7.7	2.8	2.52	2.24	1.96	1.68	10	4	5
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec																		
Inflow Volume, Mm ³	1.4	2.1	2.8	8.4	11.9	11.9	7.7	2.8	2.52	2.24	1.96	1.68																		
Module 5																														
9 a)	Discuss the Forces acting on a Gravity dam.	10	1	3																										
b)	Figure shows a homogeneous Earth dam. Examine the seepage, per meter length through the body of the dam. Co-efficient of permeability of the dam material may be taken as 8x10 ⁻³ cm/sec. Draw the base parabola and indicate	10	4	5																										

	the adjustments required to obtain phreatic line from it.			
				
OR				
10a)	Discuss the Causes of failure of Earth dam.	10	1	3
b)	A Earth dam made of a homogeneous material has the following data: Coefficient of permeability of dam material = 5×10^{-4} cm/sec, Level of top of dam = 200.0 m, Level of deepest river bed = 194.0 m, H.W.L of reservoir = 198.5 m, Width of the top of dam = 2.0 m, Upstream slope = 1.5:1, Downstream slope = 2:1. Draw the Phreatic line for this dam section and examine the discharge passing through the dam if a horizontal filter of length equal to 7.0 m is provided inward from the downstream to the dam.	10	4	5

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IV Semester B.E Semester End Examinations
MODEL QP
Water and Wastewater Engineering

JUNE /JULY 2025

Duration: 3 hrs

Max. Marks: 100

Answer five full questions choosing one complete question from each module.

Sl. No.	Questions						Marks	CO	RBT Level
	Module 1								
1 a)	Apply the concept of types of water demand to be considered for the water supply scheme in a metropolitan city.						10	1	3
b)	Year	1980	1990	2000	2010	2020	10	1	3
	Population	150000	185000	218000	250000	285000			
	In lakhs								
The Population census is as shown in the above table. Calculate the expected population of the city by 2030, 2040, 2050 by using arithmetical increase method and geometrical increase method.									
OR									
2 a)	For a Bangalore city various units of water supply system have to be designed. Illustrate the factors affecting the per capita demand.						10	1	3
b)	Water has to be supplied with Two Lakh population at the rate of 150 Lpcd from a river 2000 m away. The difference in elevation between the lowest water level in the sump and the reservoir is 36m. If the demand has to be supplied in 8 hours, determine the size of the main and the brake horse power of the pumps required. Assume maximum demand as 1.5 times the average demand. Assume $f= 0.0075$, velocity in the pipe 2.4 m/sec, and efficiency of pump 80 per cent.						10	1	3
Module 2									
3 a)	New Water treatment plant has to set up near kaveri river, Illustrate the unit process and operations adopted with a neat unit flow diagram.						10	2	3
b)	The Maximum Daily Demand of water purification Plant has been estimated as 12MLD. Compute the dimensions of suitable sedimentation tank fitted with mechanical sludge removal arrangements for the raw water supply assuming the retention period						10	2	4

	of 6hours and velocity of flow as 20cm/min.			
OR				
4 a)	Illustrate the working principle of Slow Sand Filter with neat sketch.	10	2	3
b)	Determine the dimensions of the rapid sand filter for 10MLD. Make suitable Assumption.	10	2	4
Module 3				
5 a)	Examine the following in correspondence with water treatment units: 1) Zeolite process with neat sketch. 2) Any two methods of Disinfection with merits and demerits.	10	2	3
b)	The BOD of a sewage incubated for one day at 30oC has been found to be 110 mg/L. what will be the 5 day 20oC BOD. Assume K1 = 0.1 at 20o C.	10	3	3
OR				
6 a)	Examine the following in correspondence with water treatment units: 1) Breakpoint Chlorination. 2) Types of Sewerage System	10	2	3
b)	Workout the ratio of DWF & WWF of a city having the following particulars, Area= 1 Lakh Hectares Water Demand = 130 Lpcd Population=18 Lakhs Intensity of Rainfall = 1mm/hr Impermeability factor= 0.55	10	3	3
Module 4				
7 a)	With neat sketch elaborate the understanding of Oxygen sag curve highlighting on De-oxygenation and Re-oxygenation.	10	4	3
b)	A stream saturated with DO, has a flow of 1.2 m ³ /s, BOD of 4 mg/l and rate constant of 0.3 per day. It receives an effluent discharge of 0.25 m ³ /s having BOD 20 mg/l, DO 5 mg/l and rate constant 0.13 per day. The average velocity of flow of the stream is 0.18 m/s. Calculate the DO deficit at point 10 and 20 km downstream. Assume that the temperature is 20°C throughout and BOD is measured at 5 days. Take saturation DO at 20°C as 9.17 mg/l.	10	4	4
OR				
8 a)	Highlight on the modifications of ASP.	10	4	3
b)	An average operating data for conventional ASP Plant is as follows Wastewater Flow = 40000m ³ /d Volume of aeration tank = 11000 m ³	10	4	4

	Influent BOD = 250mg/L Effluent BOD= 30 mg/L MLSS = 2800mg/L Effluent Suspended Solids = 50mg/L Waste Sludge suspended Solids =9600mg/L Quantity of waste sludge = 220m ³ /d Determine 1) Aeration Period in (h) 2) F/M ratio (kg BODper day/ Kg of MLSS) 3) BOD Removal efficiency 4) Sludge age			
Module 5				
9 a)	Illustrate the construction and working principle of trickling filter.	10	4	3
b)	Calculate the size of a High rate trickling filter for the following data: (i)Sewage flow = 4.5MLD (ii)Recirculation Ratio = 1.5 (iii)BOD of Raw Sewage = 250mg/L (iv)BOD removal in Primary Tank = 30% (v)Final Effluent BOD desired = 30mg/L.	10	4	4
OR				
10a)	Examine the following in correspondence with Wastewater treatment units: 1) Anerobic Sludge Digerster 2) Principle of Stabilization pond	10	4	4
b)	Calculate the size of a High rate trickling filter for the following data: (i)Sewage flow = 5MLD (ii)Recirculation Ratio = 1.5 (iii)BOD of Raw Sewage = 250mg/L (iv)BOD removal in Primary Tank = 30% (v)Final Effluent BOD desired = 50 mg/L.	10	4	4

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IV Semester B.E Semester End Examinations
MODEL QP
Concrete Technology

JUNE /JULY 2025

Duration: 3 hrs

Max. Marks: 100

Answer five full questions choosing one complete question from each module.

Sl. No.	Questions	Marks	CO	RBT Level
	Module 1			
1 a)	Explain the manufacturing process of cement by wet process with a flow chart.	10	1	3
b)	Illustrate Bogue's compounds and explain their contribution towards gaining of strength in cement.	10	1	3
OR				
2 a)	Explain importance of size, shape and texture of aggregates.	10	1	3
b)	Enumerate the importance of the following admixtures in concrete manufacturing, i. Fly ash ii. Plasticizers	10	1	3
Module 2				
3 a)	List the various test conducted to measure the workability of concrete and examine any one test in detail along with suitable figure & formula.	10	2	4
b)	A site engineer, while concreting at the site some of the water & cement comes out to the surface of the concrete. Analyze the cause for the above phenomenon and suggest the preventive measures	10	2	4
OR				
4 a)	Dissect workability and analyze the different factors affecting workability of concrete.	10	2	4
b)	As a quality engineer in an RMC plant, analyze the concrete manufacturing process by listing the essential stages along with the detailed analysis of batching and mixing process.	10	2	4
Module 3				
5 a)	Examine how water-cement ratio influences on strength development characteristics of concrete.	10	2	4

b)	Dissect shrinkage of concrete and examine various classification of shrinkage of concrete.	10	2	4
OR				
6 a)	Examine how the compressive strength of concrete is determined in laboratory.	10	2	4
b)	Analyse briefly the mechanism of sulphate attack & chloride attack in hardened concrete.	10	2	4
Module 4				
7	Design a concrete mix of M_{25} grade as per IS 10262:2019, with the following stipulation. a) Grade designation- M_{25} b) Type of cement OPC 43 grade c) Maximum nominal size of aggregate : 20mm d) Minimum cement content: 300 Kg/m^3 e) Workability: Slump: 75mm f) Exposure condition: moderate g) Method of concrete placing: Manual h) Maximum cement content: 450 Kg/m^3 i) Chemical admixture: Nil j) Fine aggregate zone: Zone 2 A. Specific gravity of cement: 3.15 B. Course aggregate i) Specific gravity: 2.80 ii) Water absorption: 1% C. Fine aggregate i) Specific gravity: 2.65 ii) Water absorption: 2% Assume suitable data if required.	20	3	5
OR				
8	Choose and explain the steps to be followed as per IS 10262:2019 method of concrete mix design.	20	3	5
Module 5				
9 a)	Enumerate the necessity of RMC with advantages and disadvantages.	10	1	3
b)	Identify different tests conducted on SCC and explain any one in detail.	10	1	3
OR				
10a)	Illustrate different types of fibers used in FRC along with application.	10	1	3
b)	Write a short note on i) Light Weight Concrete ii) Geopolymer Concrete	10	1	3

**M23BCV407A**

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**IV Semester B.E Semester End Examinations****MODEL QP****JUNE /JULY 2025****Building Information Modelling in Civil Engineering**

Duration: 3 hrs

Max. Marks: 100

Answer five full questions choosing one complete question from each module.

Sl. No.	Questions	Marks	CO	RBT Level
Module 1				
1 a)	Today we all know about the BIM concepts and its application in Civil Engineering, summarize how it evolution from 2D Drawings to BIM Model over the years of time	10	1	2
b)	If you are developing a BIM models, Illustrate the process of BIM model development	10	1	2
OR				
2 a)	Illustrate the Design Authoring in BIM 3D model development	10	1	2
b)	If you are developing a BIM models as per ISO 19650, Summarize the stages of BIM Modeling process.	10	1	2
Module 2				
3 a)	Explain the various visualization modes available in a BIM model. How do walkthroughs, flythroughs, sectioning, and viewpoints enhance the understanding of a project? Support your answer with examples of mobile/tablet-based visualization tools.	10	1	2
b)	What is the concept of BIM Kiosks and BIM Rooms? Discuss how Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR) are integrated into BIM environments for enhanced visualization and collaboration.	10	1	2
OR				
4 a)	Define clash detection in BIM. Describe the types of clashes, the clash detection process, and how the Clash Detection Priority Matrix aids in effective resolution of interferences.	10	1	2
b)	Discuss the process of clash check and report generation in BIM. What are the key steps involved in clash grouping, applying detection rules, and preparing final reports? Explain with reference to a demo-based scenario.	10	1	2
Module 3				

5 a)	Explain the role of Common Data Environment (CDE) in BIM documentation. How does it improve upon traditional information-sharing methods? Describe key components such as file naming conventions, roles, and request/review processes.	10	2	3
b)	Discuss the process of generating 2D drawings from a BIM model. What are the advantages and limitations of using CDE and cloud computing for storing and managing these drawings?	10	2	3
OR				
6 a)	Define Level of Development (LOD) in BIM. Differentiate between Level of Detail and Level of Information, and explain their importance using examples like wall foundation or plumbing fixtures.	10	2	3
b)	What is an LOD matrix and model progression matrix in BIM? How are they prepared, and how do they guide stakeholders in the design and construction stages? Illustrate with any two BIM components like an inverted T-beam or packaged generator assembly.	10	2	3
Module 4				
7a)	Explain the concept of 4D BIM. How does integrating time (schedule) with 3D models enhance construction planning and sequencing? Illustrate the process using a Gantt Chart and discuss its limitations.	10	3	3
b)	Describe the synchronization of a 4D BIM model with a project schedule. How does this aid in reviewing project progress with respect to planned vs actual dates? Mention any tools or reports generated during this process.	10	3	3
OR				
8 a)	Discuss the applications of Field BIM in on-site coordination. How do 3D coordination, visual communication, site utilization planning, and the use of wearables contribute to effective field management?	10	3	3
b)	List and explain other advanced applications of Field/4D BIM. Focus on its use in safety planning, risk analysis, digital fabrication, scan-to-BIM, and as-built model generation.	10	3	3
Module 5				
9 a)	Define 5D BIM and explain the process of Quantity Take-Off (QTO) with Unit of Measurement (UoM). How does 5D BIM contribute to cost estimation and control? Support your answer with examples like QTO for walls, plaster, and tiles.	10	4	3
b)	What is an Asset Information Model (AIM)? Explain its role in Facility Management using COBie structures, asset/space attributes, and classification codes. Illustrate with examples from different infrastructure systems.	10	4	3
OR				
10a)	Discuss the emerging trends beyond traditional BIM. How are	10	4	3

	concepts like Industrialization, IoT, Big Data, and AI/ML being integrated into BIM for smarter construction and project management?			
b)	What is a Digital Twin in the context of smart infrastructure? Differentiate between a National Digital Twin and a City-level Digital Twin. Explain the fundamental requirements for a successful digital twin and its applications.	10	4	3
