DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Examination Summer 2024

Course: B. Tech   **Branch: Civil & Infra/ Civil Engineering**   **Semester: V**

Subject Name: Design of Steel Structures   **Subject Code: BTCIC501/ BTCVC501**

Max Marks: 60   **Date: 01/07/2024**   **Duration: 3 Hrs.**

Instructions to the Students:
1. *All questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mentioned it clearly.*
5. *Use IS 800, Steel table and IS 875 are permitted*

		Level/CO	Marks
Q. 1	**Solve any TWO of the following**		**12**
(A)	State the advantages and disadvantages of steel structures	Understand	06
(B)	Calculate the strength of ISA 90X60X8 mm used as a tie member with its longer leg connected by 16mm diameter rivets.	Analyze	06
(C)	Compare rivet and welding connections?	Synthesis	06
Q.2	**Solve any TWO of the following**		**12**
(A)	An angle of ISA 50X50X6 mm is to carry an axial load of 72KN. The angle is to be connected to 8mm thick gusset plate. Design welded connection.	Application	06
(B)	Design a riveted connection for single ISA 75 x 75 x 8mm connected to 10mm thick gusset plate by using 10mm dia. Rivets at site to carry a load of 90KN.	Application	06
(C)	Distinguish between web buckling and web crippling?	Synthesis	06
Q. 3	**Solve any TWO of the following**		**12**
(A)	Describe the components of gantry girder with the help of neat sketch.	Knowledge	06
(B)	Calculate dead load per panel for a roof truss using following details: a) Span of truss = 20m b) spacing = 4m c) rise = 3m d) Number of panels = 10 m e) weight of covering = 100N/ M^2 f) Self weight of truss = 105 N/ M^2 g) weight of bracing = 75N/ M^2 h) weight of covering = 150N/ M^2	Application	06
(C)	Describe the component part of industrial truss.	Knowledge	06
Q. 4	**Solve any TWO of the following**		**12**
(A)	Design a column using I- section of length 5m subjected to an axial load of 1175 KN. The column is effectively held in position at both ends and not restrained against rotation at one end. Take fy = 250Mpa.	Application	06
(B)	Write short note on Gusseted base foundation.	Synthesis	06
(C)	Design a slab base for a column section consists of two channels ISMC 400 placed back to back with 200mm gap. The laced column carry load of 1350 KN. Use M15 Grade concrete for pedestal.	Application	06
Q. 5	**Solve any TWO of the following**		**12**
(A)	Explain idealized stress-strain curve for mild steel.	Knowledge	06
(B)	Distinguish between plastic design and elastic design.	Synthesis	06

| **(C)** | Explain the concept of shape factor and load factor | Synthesis | 06 |

---**END**---

Dr. Babasaheb Ambedkar Technological University

Supplementary Examination – Summer 2024

Course: B. Tech.   **Branch: Civil Engineering**   **Semester: V**

Subject Code & Name: BTCVC502   Geotechnical Engineering

Max Marks: 60   **Date: 03/07/2024**   **Duration: 3 Hrs**

Instructions to the Students:
1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) onwhich the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve <u>any two</u> of the following.**		**12**
A)	Write the difference between 'residual' and 'transported' soils.	**Understand/ CO1**	**06**
B)	One cubic metres of wet soil weighs 20 kN. If the specific gravity of soil particles is 2.70 and water content is 20 %, find the void ratio, dry density and degree of saturation.	**Apply/ CO1**	**06**
C)	A saturated clay has a water content of 40% and a bulk specific gravity of 1.84. Determine the void ratio, porosity and specific gravity of particles.	**Analyze/ CO1**	**06**
Q.2	**Solve <u>any two</u> following questions.**		**12**
A)	Define the following terms: A.1) Plasticity Index, A.2) Shrinkage Index, A.3) Consistency Index	**Understand/ CO1**	**06**
B)	Enlist the different methods for the determination of water content recommended by IS code and explain one of the methods in detail.	**Understand/ CO1**	**06**
C)	The dry unit weight of a sand sample in the loosest state is 13.34 kN/m^3 and in the densest state, it is 21.19 kN/m^3. Determine the density index of this sand when it has a porosity of 33%. Assume the grain specific gravity as 2.68	**Apply / CO1**	**06**
Q. 3	**Solve <u>any two</u> of the following.**		**12**
A)	Enlist the different methods to determine the permeability of soil and explain the one of them.	**Understand/ CO2**	**06**
B)	A sample in a variable head permeameter is 8 cm in diameter and 20 cm high. The permeability of the sample is estimated to be 10×10^{-4} cm/s. If it is desired that the heading the stand pipe should fall from 24 cm to 12 cm in 3 min., determine the size of the standpipe which should be used.	**Apply / CO2**	**06**
C)	A 1.25 m layer of the soil (G = 2.65 and porosity = 40 %) is subject to an upwardseepage head of 1.85 m. What depth of coarse sand would be required above the soil to providea factor of safety of 2.0 against piping assuming that the coarse sand has the same porosity and specific gravity as the soil and that there is negligible head loss in the sand.	**Analyze / CO2**	**06**

Q.4 **Solve any two of the following.** 12

A) Explain the direct shear test. **Understand/ CO2** **06**

B) A vane, 10.8 cm long, 7.2 cm in diameter, was pressed into a soft clay at the bottom of a bore hole. Torque was applied and the value at failure was 45 Nm. Find the shear strength of the clay on a horizontal plane. **Apply / CO2** **06**

C) Calculate the potential shear strength on a horizontal plane at a depth of 3 m below the surface in a formation of cohesionless soil when the water table is at a depth of 3.5 m. The degree of saturation may be taken as 0.5 on the average. Void ratio = 0.50; grain specific gravity = 2.70; angle of internal friction = 30°. What will be the modified value of shear strength if the water table reaches the ground surface ? **Analyze / CO2** **06**

Q. 5 **Solve any two of the following.** 12

A) Explain in detail the concept of *compressibility of soils.* **Understand/ CO2** **06**

B) State and explain the assumptions in 'Terzaghi's theory of 1D consolidation'. **Understand/ CO2** **06**

C) A retaining wall, 6 m high, retains dry sand with an angle of friction of 30° and unit weight of 16.2 kN/m^3. Determine the earth pressure at rest. If the water table rises to the top of the wall, determine the increase in the thrust on the wall. Assume the submerged unit weight of sand as 10 kN/m^3. **Apply / CO2** **06**

*** End ***

Dr. Babasaheb Ambedkar Technological University

Supplementary Examination – Summer 2024

Course: B. Tech.   **Branch: Civil Engineering**   **Semester: V**

Subject Code & Name: BTCVC502_Y19   Structural Mechanics II

Max Marks: 60   **Date:03/07/2024**   **Time: 3 Hrs**

Instructions to the Students:
1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/ CO)	Marks
Q. 1	**Solve <u>any two</u> of the following.**		**12**
A)	A braced cantilever pin-jointed plane frame is loaded as shown in figure below. All the members are of the same material and have the same cross-sectional area. Find the axial force in the member AD. Use Strain Energy Method.	CO 1	06
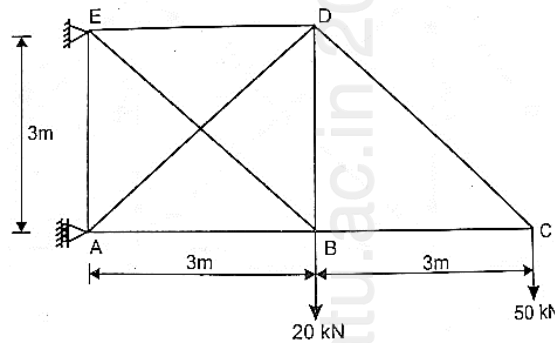


B)	Two-point loads of 100 kN and 200 kN spaced 3 m apart cross a girder of span 15 m from left to right with 100 kN load loading. Draw the influence line for SF, BM. Also find the value of Maximum BM at section D, 6 m from left hand support.	CO 3	06
C)	A train of 5-wheel loads 120 kN, 160 kN, 400 kN, 260 kN and 240 kN at distance of 2.5 apart (distance b/w any two loads is 2.5 m) respectively crosses a simply supported beam of span 22.5 m as shown below. Using influence lines, calculate the absolute maximum bending moment anywhere in the span.	CO 3	06
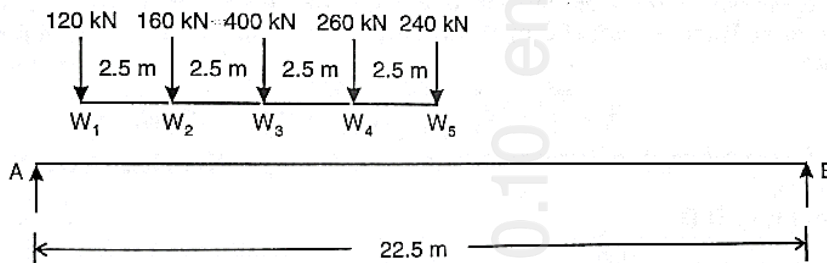
Q.2	**Solve <u>any two </u>of the following.**		**12**
A)	A suspension cable of 130 m horizontal span is supported at the same level. It is subjected to a UDL of 28.5 kN/m. If the maximum tension in the cable is limited to 5000 kN, calculate the minimum central dip needed.	CO 1	06

B)	A three hinged parabolic arch has a span of 30 m and central rise of 6 m. Five Wheel loads of 4, 5, 5, 3, 3 kN spaced 3 m, 2 m, and 2 m in order, cross the arch from left to right with the 4 kN load leading. When the leading load is 20 m from the left hinge, calculate the horizontal thrust in the arch. Also calculate the BM at the section under the tail load.	CO 1	06
C)	A suspension bridge is of 160 m span. The cable of the bridge has a dip of 12 m. The cable is stiffened by a three hinged girder with hinges at either end and at centre. The dead load of the girder is 15 kN/m. Find the greatest positive and negative bending moments in the girder when a single concentrated load of 340 kN passes through it. Also find maximum tension in the cable.	CO1	06

Q. 3 **Solve any two of the following.**   **12**

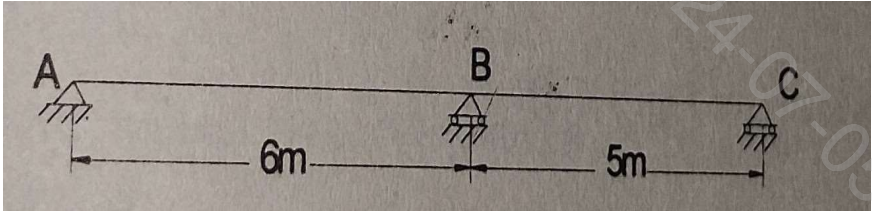|			
A)	State and explain the steps for analysis of indeterminate structures as propped cantilever, fixed beam, continuous beam, pin jointed frame and rigid jointed frame by Direct Flexibility method.	CO 1	06
B)	Determine the flexibility coefficients and develop the flexibility matrix for the cantilever beam of span L subjected to point load 'P' kN and clockwise moment 'M' at free end.	CO 1	6
C)	For the continuous beam shown below generate the flexibility matrix.	CO 1	06

Q.4 **Solve any two of the following.**   **12**
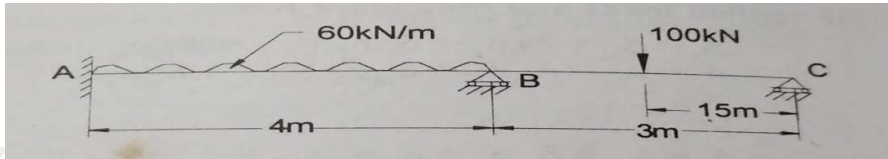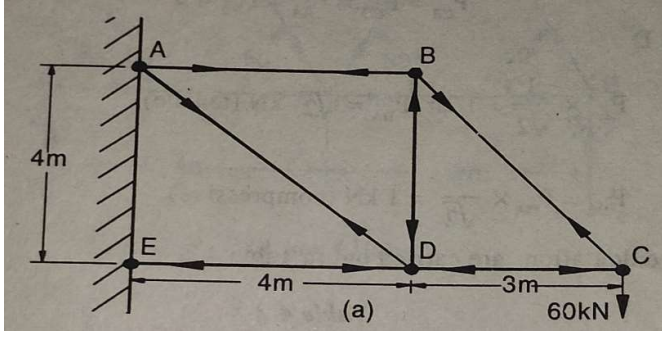
A)	State and explain the steps for analysis of indeterminate structures such as propped cantilever, fixed beam, continuous beam, pin jointed frame and rigid jointed frame by Direct Stiffness method.	CO 1	06
B)	Determine the stiffness coefficients and develop the stiffness matrix for the cantilever beam of span L subjected to point load 'P' kN and clockwise moment 'M' at free end.	CO 1	06
C)	For the continuous beam shown in Q.3 C Generate the stiffness matrix.	CO 1	06
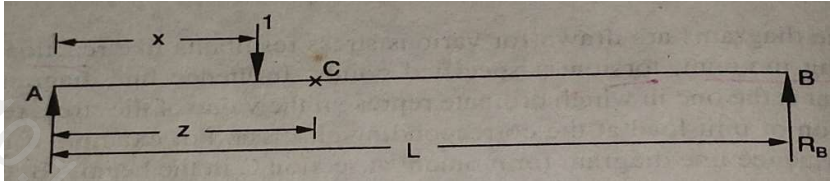
Q. 5 **Solve any two of the following.**   **12**

A)	Explain in detail the concept of '*shape function*'.	CO 2	06
B)	Explain in detail the concept of '*Pascal's Triangle*'.	CO 2	06
C)	Enlist and explain the different types of finite elements.	CO 2	06

*** End ***

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE	
	Supplementary Examination – Summer 2024	
	Course: B. Tech.　　　　Branch : Civil Engineering　　　　Semester : V	
	Subject Code & Name: BTCVC503 Structural Mechanics-II	
	Max Marks: 60　　　　Date: 05/07/2024　　　　Duration: 3 Hr.	

Instructions to the Students:
1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/ CO)	Marks
Q. 1	**Solve Any Two of the following**		
A)	State and explain Muller-Breslau principle	**CO2**	**06**
B)	Compare flexibility and stiffness methods.	**CO4/5**	**06**
C)	State and explain application of Eddy's theorem.	**CO3**	**06**
D)	Write a short note on 'Finite element method'	**CO5**	**06**
Q.2	**Solve Any ONE of the following.**		
A)	Compute the ordinates of influence lines for reaction R_a for the beam as shown in figure.1 at 1m interval and draw the influence line diagram. The M.I is constant uniform throughout. **Fig.1**	**CO2**	**12**

B)	Analyze the beam as shown in figure2, by Flexibility matrix method **Fig.2**	**CO5**	**12**
Q. 3	**Solve Any ONE of the following.**		
A)	Determine the horizontal thrust developed in a two-hinged semi-circular arch subjected to a u.d.l on only one-half of the arch. EI is constant throughout.	**CO4**	**12**
B)	A three-hinged stiffening girder of a suspension bridge of span 100 m is subjected to two point loads of 200 kn and 300kn at a distance of 25 m and 50 m from the left end. find the SF and BM for the girder at a distance 30 m from the left end. The supporting cable has a central dip of 10 m.find also maximum tension and its slope in the cable.	**CO3**	**12**
Q.4	**Solve Any ONE of the following.**		
A)	Determine the vertical deflection of point D in the truss as shown in figure 3. Cross sectional area for members AD & DE are 1500 mm^2 and for remaining members is 1000 mm^2. Take E=200GPa. **Fig.3**	**CO1**	**12**
B)	Analyze the beam as shown in figure 2, by stiffness method. Take EI constant throughout	**CO4**	**12**
Q. 5	**Solve Any One of the following.**		

A)	Draw ILD for the reaction R_a, SF at C moment at C for the beam as shown in figure 4. **Fig.4**	**CO6**	**12**
B)	A three-hinged parabolic arch with supports at same level, 24 m in span with 4 m central rise is subjected to a u.d.l of 30 kN/m on left half portion and a point load of 50 kN at a distance of 18m from left support throughout its span . Calculate the moment, thrust and radial shear at a section 6m from the left support.	**CO2**	**12**
	*** End ***		

Dr. Babasaheb Ambedkar Technological University, Lonere

Supplementary Examination Summer 2024

Course: B. Tech.   **Branch: Civil Engineering**   **Semester: V**

Subject Code & Name: ***BTCVC503-Y18 _Soil Mechanics***

Max Marks: 60   **Date: 05/07/2024**   **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/ CO)	Marks
Q. 1	**Solve any <u>two</u> of the following.**		**12**
A)	A sample of wet silty clay soil has a mass of 126 kg. The following data were obtained from laboratory test on the sample. Wet density: 2.1 g/cm^3, Specific Gravity:2.7, water content: 15 %. Determine: 1) Dry Density, 2) Void Ratio and 3) Degree of Saturation.	**CO 1**	**06**
B)	A soil sample in its natural state has, when fully saturated, a water content of 32.5 %. Determine the voids ratio, dry and total unit weights. Calculate the total weight of water required to saturate a soil of mass of volume 10 m^3. Assume specific gravity as 2.69	**CO 1**	**06**
C)	Sketch the block diagram for three phases of soil element. Write expressions of density of soil in terms of other parameters for different cases of soil: 1) Partially Saturated (S<100%) 2) Fully Saturated (S=100%) 3) Fully Dry (S=0%)	**CO 1**	**06**
Q.2	**Solve <u>any two</u> of the following.**		**12**
A)	How consistency of soil can be expressed by different Atterberg limits of soil? Explain them in detail.	**CO 1**	**06**
B)	Two soil samples tested in a soil mechanics laboratory gave the following results:	**CO 1**	**06**

	Sample no. 1	Sample no. 2
Liquid Limit	50 %	40 %
Plastic Limit	30 %	20 %
Flow indices I$_f$	27	17

i)   Determine the toughness indices and
ii)   Comment on the type of soil

C) Define and explain in detail the below terms:

    i)   Toughness Index, ii) Liquidity Index, and iii) Consistency Index

Q. 3   **Solve <u>any two</u> of the following.**   **12**

A)   i) Define and explain the term Hydraulic Gradient.   **CO 2**   **06**
ii) State and explain the Darcy Law.

B) A sand sample of 35 cm^2 cross sectional area and 20 cm long was tested in a   **CO 2**   **6**
constant head permeameter. Under a head of 60 cm, the discharge was 120 ml
in 6 min. The dry weight of a sand used for the test was 1120 g, and specific
gravity 2.68. Determine

    i) Hydraulic conductivity in cm/sec,
    ii) The Discharge Velocity, and iii) The Seepage velocity

C) The following details refer to a test to determine the value of k of a soil sample: **CO2**   **06**
Sample thickness- 2.5 cm, diameter of soil sample- 7.5 cm, diameter of stand
pipe- 10 mm, initial head of water in the stand pipe – 100 cm, water level in
the stand pipe after 3 h 20 min – 80 cm. Determine the value a 'k' if e = 0.75.
What is the value of 'k' of the Same soil at a void ratio e = 0.90?

Q.4   **Solve <u>any two</u> of the following.**   **12**

A) State and explain fundamental equation of shear strength of soil given by   **CO2**   **06**
French Engineer Coulomb.

B) What is the shearing strength of soil along a horizontal plane at a depth of 4m   **CO2**   **06**
in a deposit having the following properties:
Angle of friction = 35^0, Dry unit weight = 17 kN/m^3, Specific gravity = 2.7
Assume the ground water table is at a depth of 2.5 m from the ground surface.
Also find the change in shear strength when the water table rises to the ground
surface.

C) A saturated specimen of cohesionless sand was tested under drained conditions   **CO2**   **06**
in a triaxial compression test apparatus and the sample failed at a deviator stress
of 482 kN/m^2 and the plane of failure made an angle of 60^0 with the horizontal.
Find the magnitudes of the principal stresses. What would be the magnitudes
of the deviator stress and the major principal stress at failure for another
identical specimen of sand if it is tested under a cell pressure of 200 kN/m^2?

Q. 5   **Solve any <u>two</u> of the following.**   **12**

A) Define and explain in detail the term 'Consolidation' and Process of   **CO 2**   **06**
consolidation

B) The loading period for a new building extended from May 1995 to May 1997.   **CO 2**   **06**
In May 2000, the average measured settlement was found to be 11.43 cm. It is
known that the ultimate settlement will be about 35.56 cm. Estimate the
settlement in May 2005. Assume double drainage to occur.

C) A rigid retaining wall 5 m high supports a backfill of cohesionless soil with φ   **CO 2**   **06**
= 30^0. The water table is below the base of the wall. The backfill is dry and has
a unit weight of 18 kN/m^3. Determine Rankine's passive earth pressure per
meter length of the wall.

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*** End ***

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Summer Examination – 2024

Course: B.Tech.   **Branch: Civil Engineering**   **Semester: V**

Subject Code & Name: Concrete Technology (BTCVC504)

Max Marks: 60   **Date: 08/07/2024**   **Duration: 3 Hr.**

Instructions to the Students:
1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Explain procedure for determining Initial Setting time of Cement.	**CO 1**	**6**
B)	Explain classification of Aggregate.	**CO 1**	**6**
C)	Illustrate Wet manufacturing process of Cement with flow chart.	**CO 1**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	What is batching? Explain its types.	**CO 1**	**6**
B)	Explain operations involved in concreting chain.	**CO 1**	**6**
C)	Define Workability. Explain Slump Cone Test with diagram	**CO 2**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Define Admixture. Explain functions of Admixture.	**CO 2**	**6**
B)	Illustrate difference between Accelerator & Retarder.	**CO 2**	**6**
C)	Write a short note on Plasticizer and Super-Plasticizer.	**CO 2**	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	What is Alkali Aggregate Reaction? Explain factors affecting on it.	**CO 1**	**6**
B)	Define: a) Durability b) Fresh Concrete c) Segregation d) Im-permeability e) Characteristic Strength f) Creep	**CO 2**	**6**
C)	Explain Duff Abraham's Law in detail	**CO 2**	**6**
Q. 5	**Solve Any Two of the following.**		**12**
A)	Write a short note on Sulphate Attack.	**CO 3**	**6**
B)	Explain procedure for Concrete Mix Design by Indian Standard Method	**CO 3**	**6**
C)	Illustrate Non – destructive testing of concrete.	**CO 3**	**6**

*** End ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Semester Examination – Summer 2024

Course: B. Tech.　　　　**Branch: Civil Engineering**　　　　**Semester: V**

Subject Code & Name:　BTCVC504_Y19　　**Environmental Engineering**

Max Marks: 60　　　　　**Date:08 /07/2024**　　　　**Duration: 3.00 Hr.**

Instructions to the Students:
1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/ CO)	Marks
Q. 1	**Solve Any Two of the following.**		
A)	The population of a town for the past census data is given below Estimate population after 3 decades by geometric increase method.	**CO1**	**6**

Year	1970	1980	1990	2000
Population in thousands	34210	45672	563100	67245

		(Level/ CO)	Marks
B)	Explain factors affecting rate of water demand	**CO1**	**6**
C)	Write in details: chemical characteristics of water with their permissible value.	**CO1**	**6**
Q.2	**Solve Any Two of the following.**		
A)	What are the objectives of aeration process? Explain types of aeration process with neat labelled diagram.	**CO2**	**6**
B)	Define the terms 'disinfection' and 'sterilization'. Explain various types of disinfectants used for treatment of water.	**CO2**	**6**
C)	Compare Slow sand filter and Rapid sand filter.	**CO2**	**6**
Q. 3	**Solve Any Two of the following.**		
A)	What do you understand by continuous and intermittent supply system of water? Compare both with their advantages and disadvantages.	**CO3**	**6**
B)	Describe various methods of distribution system with neat labelled diagram.	**CO3**	**6**
C)	Explain various classification of Layout of Distribution System with neat labelled diagram.	**CO3**	**6**
Q.4	**Solve Any Two of the following.**		
A)	Draw wastewater treatment flow sheet and explain the functions of each component	**CO3**	**6**

B) Determine Ultimate BOD for a sewage having 5 day BOD at 20^0C as 200 mg/lit. Assume deoxygenation constant as 0.12 per day.   **CO4**   **6**

C) Explain the various classification of Solid waste.   **CO4**   **6**

Q. 5 **Solve Any Two of the following.**

A) What is Air Pollution? What are the sources of air pollution?   **CO5**   **6**

B) Describe briefly the effect of air pollution on Human and vegetation.   **CO5**   **6**

C) Enlist Various equipment's used for controlling air pollution. Explain with neat diagram any one air pollution controlling equipment.   **CO5**   **6**

*** End ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE - RAIGAD 402103

Supplementary Examination Summer 2024

Branch: B. Tech. **Branch: Civil Engineering** **Semester: - V**

Subject Code and Name: BTCVPE506G Material, Testing and Evaluation

Date:- 10/07/2024

Marks: 60

Duration: 3 Hrs.

Instructions to the Students:

1. Each question carries 12 marks.

2. Attempt any **five** questions of the following.

3. Illustrate your answers with neat sketches, diagram etc., whenever necessary.

4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

		(**Marks)**
Q.1	List the types of Material used in Civil Engineering construction and give specific use of each Material	**(12)**
Q.2	Write down Properties of Concrete ,Glass and Plastic in detail	**(12)**
Q.3	Explain RCC and FRC in detail	**(12)**
Q.4	Explain 3D Printing and self- healing concrete in detail	**(12)**
Q.5	Write down necessity of Material testing. Explain destructive tests and Non destructive test in detail	**(12)**
Q.6	List the types of Testing machines. Explain any one in detail.	**(12)**

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