Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

Re-Examinations: February 2024

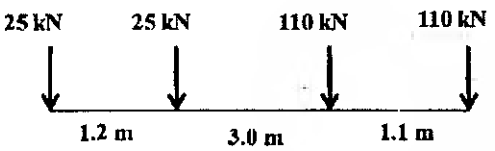
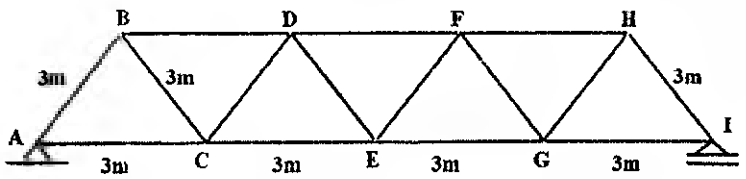
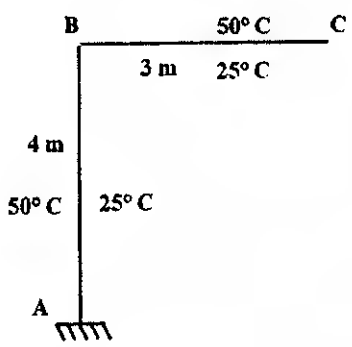
Program: B.Tech. in Civil Engineering T.Y Sem V **Duration: 3 Hours**

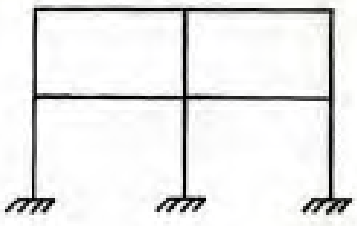
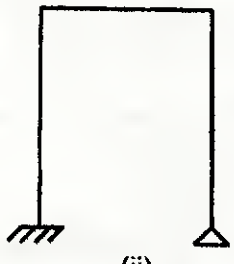
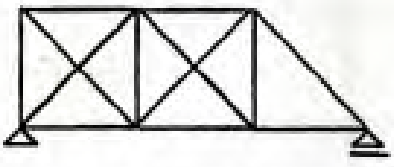
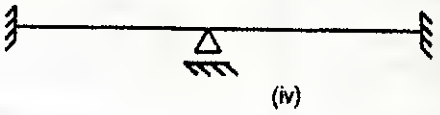
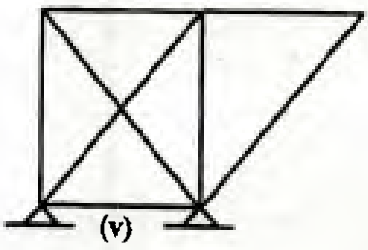
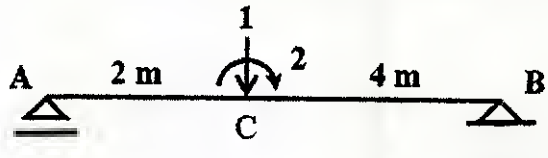
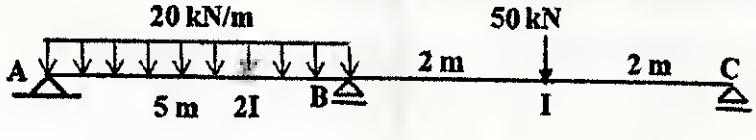
Course Code: PC-BTC 501 **Maximum Points: 100**

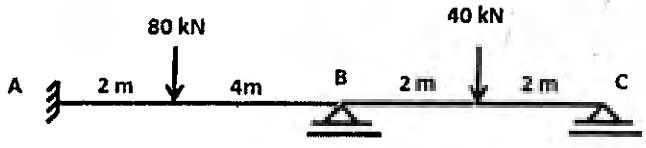
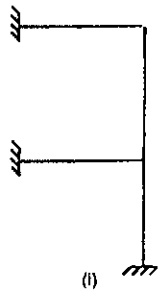
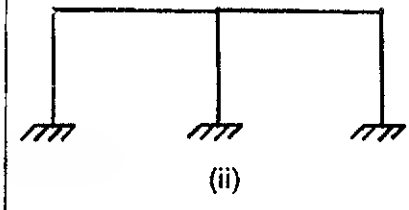
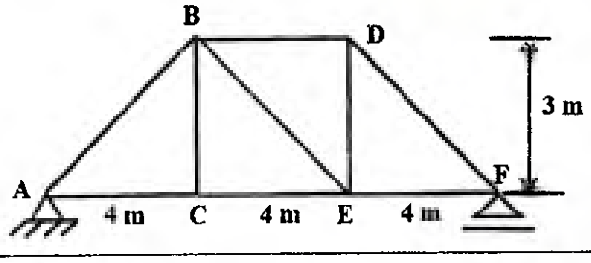
Course Name: Structural Engineering **Semester: V**

1. Attempt any FIVE questions out of SEVEN questions.
2. **Answers to all sub questions should be grouped together.**
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary and state the same clearly.

Q.No.	Questions	Points	CO	BL	PI
Q.1(a)	**A symmetrical three hinged parabolic arch of span 50 m and central rise of 8 m, is subjected to two concentrated loads of 160 kN and 120 kN acting at 10 m and 35 m respectively from the left support. Determine** **(a) the support reactions** **(b) radial shear force, normal thrust and BM just to the right of 160 kN load** **(c) radial shear force, normal thrust and BM at a section 30m away from the left support.** **(c) draw BMD.**	**15**	**1**	**4**	1.1.1 1.3.1 2.4.1
Q.1(b)	**What are the advantages and disadvantages of an arch? Explain.**	**05**	**1**	**2**	1.3.1
Q.2(a)	**In the case of a suspension cable passing over a smooth pulley on the top of a pier and anchored at the other end of the pulley, what forces are transmitted to the base of the pier?**	**04**	**1**	**2**	1.3.1
Q.2(b)	**A suspension cable of span 80 m and a central dip of 10 m is supporting a three hinged stiffening girder. The dead load of the girder is 15 kN/m. Two point loads of 240 kN and 160 kN act on the girder at distances of 20 m and 55 m from the left support.** **(a) Determine the maximum and minimum tension in the cable** **(b) Draw SFD and BMD for the girder** **If the suspension cable passes over a smooth pulley on the top of a pier of height 16m and the anchor cable is at 45° to the horizontal, find the forces transmitted to the base of the pier.**	**16**	**1**	**3,4**	1.3.1 2.1.3

Q.3(a)	**The load system shown in figure below crosses a simply supported girder of span 16m. Determine the value of absolute maximum bending moment anywhere in the girder.**	10	2	3,4	1.3.1 2.1.3
					
Q.3(b)	**For the pin jointed frame shown in figure below draw influence diagram for axial force in members DF, DE and CE.**	10	2	3,4	1.3.1 2.1.3
					
Q.4(a)	**For the frame shown in figure calculate the vertical deflection of C due to change in temperature as indicated in figure. Take $\alpha = 12x10^{-6}/°C$ and depth of all members as 350 mm.**	10	3	3,4	1.3.1 2.1.3
					

Q.4(b)	**Determine the static and kinematic indeterminacy of the structures shown in figures below.**	**10**	**3**	3,4	1.3.1 2.1.3
	 (i)  (ii)				
	 (iii)  (iv)				
	 (v)				
Q.5(a)	**Calculate the flexibility coefficients for the beam shown in figure w.r. to the coordinates indicated in figure.**	**08**	**4**	3,4	1.1.1 1.3.1 2.4.1
					
Q.5(b)	**Analyse the beam loaded as shown in figure below by using force method and find the reactions at supports B and C.**	**12**	**4**	3,4	1.1.1 1.3.1 2.4.1
					

Q.6(a)	**Analyse the beam loaded as shown in figure below by using slope deflection method and find the member end moments.**	12	4	3,4	1.1.1 1.3.1 2.4.1
					
Q.6(b)	**For the structure shown in figures below determine** **(a) the degree of static external and internal indeterminacy and** **(b) kinematic indeterminacy considering and neglecting axial deformations.**	08	3	3,4	1.3.1 2.1.3
	 				
Q.7(a)	**The members of the truss shown in figure are subjected to temperature increase of 40^0 C. Calculate the vertical deflection of joint E due to the increase in temperature. Take $\alpha = 12x10^{-6}/°C$.**	12	3	3,4	1.1.1 1.3.1 2.4.1
					
Q.7(b)	**How is the information about the degree of static and kinematic indeterminacy useful in analyzing an indeterminate structure?**	04	3	2	1.3.1
Q.7(c)	**Define flexibility coefficient f_{ij} and state the important properties of the flexibility matrix.**	04	4	2	1.3.1

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SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examinations: December 2023

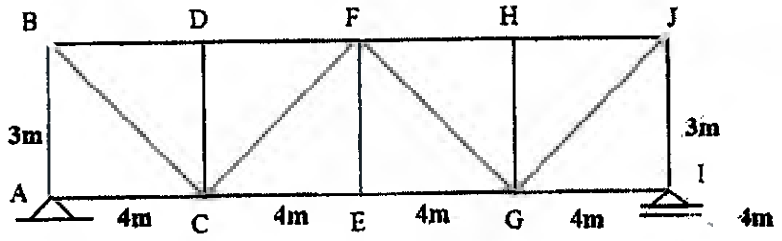
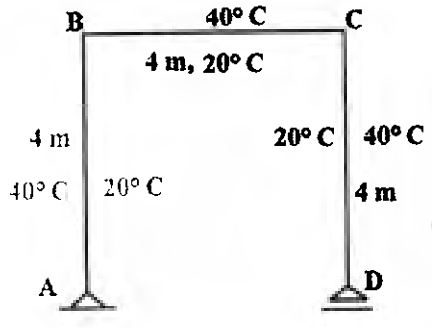
Program: B.Tech. in Civil Engineering **Duration: 3 Hours**

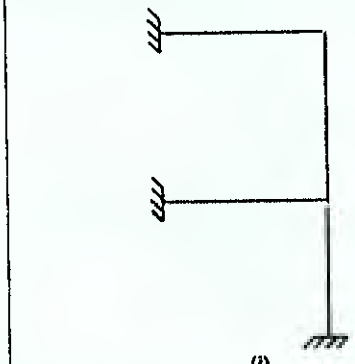
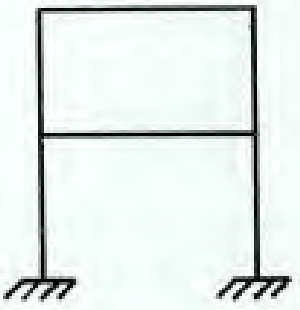
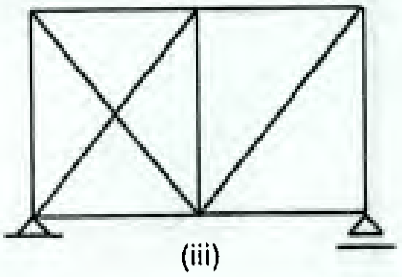
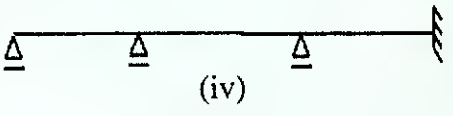
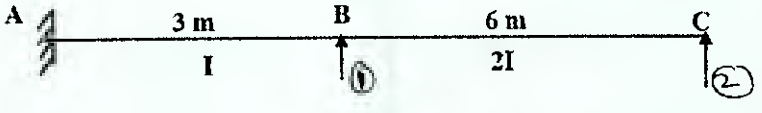
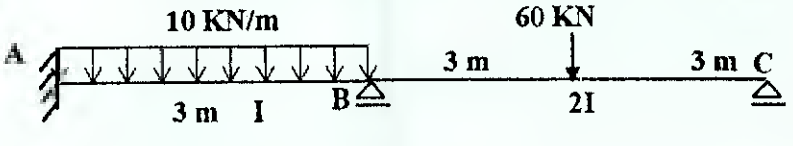
Course Code: PC-BTC 501 **Maximum Points: 100**

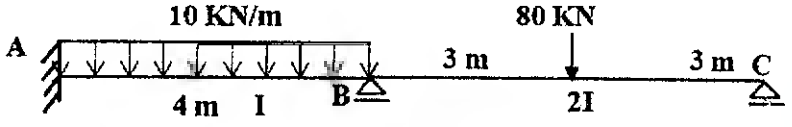
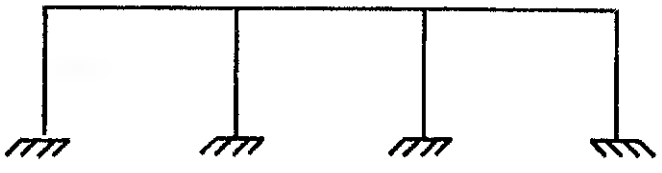
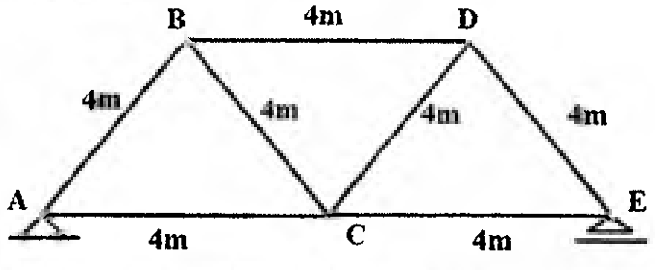
Course Name: Structural Engineering **Semester: V**

1. Attempt any FIVE questions out of SEVEN questions.
2. **Answers to all sub questions should be grouped together.**
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary and state the same clearly.

Q.No.	Questions	Points	CO	BL	PI
Q.1(a)	**A symmetrical three hinged parabolic arch of span 40 m and central rise of 7 m is subjected to two concentrated loads of 100 kN and 150 kN acting at 12 m and 28 m respectively from the left support. Determine** **(a) the support reactions** **(b) radial shear, normal thrust and BM just to the left of 100 kN load** **(c) radial shear, normal thrust and BM just to the left of 150 kN load** **(c) draw BMD**	15	1	4	1.1.1 1.3.1 2.4.1
Q.1(b)	**Write a note on the types of arches based on the profile and degree of indeterminacy.**	05	1	2	1.3.1
Q.2(a)	**Name the different components of suspension cable with three hinged stiffening girder and state the internal forces carried by each one of them.**	04	2	2	1.3.1
Q.2(b)	**A suspension cable of span 70 m and a central dip of 9 m is supporting a three hinged stiffening girder. The dead load of the girder is 12 kN/m. The girder is subjected to a point load of 120 kN at a distance of 16 m from the left support A and a udl of 5 kN/m on the right half of the span.** **(a) Determine the maximum and minimum tension in the cable** **(b) Draw SFD and BMD for the girder** **If the suspension cable passes over a smooth pulley on the top of a pier of height 15m and the anchor cable is at 45° to the horizontal, find the forces transmitted to the base of the pier.**	16	2	3,4	1.3.1 2.1.3

Q.3(a)	**For a simply supported girder of span 30 m, draw influence line diagrams for** **a) bending moment at a section C, 12 m from left support A** **b) absolute maximum positive shear force anywhere in the beam** **If the load system shown in the figure below crosses the above girder, then determine the value of the absolute maximum positive shear force.**	10	2	3,4	1.3.1 2.1.3
Q.3(b)	**For the pin jointed frame shown in figure below draw influence line diagram for axial force in members FH, FG and EG.**	10	2	3,4	1.3.1 2.1.3
					
Q.4(a)	**For the frame shown in figure calculate the horizontal deflection of D due to change in temperature as indicated in figure. Take α = $12x10^{-6}$/°C and depth of all members as 450 mm.**	12	3	3,4	1.3.1 2.1.3
					

Q.4(b)	**Determine the static and kinematic indeterminacy of the structures shown in figures below.**	08	3	3,4	1.3.1 2.1.3
	 (i)  (ii)				
	 (iii)  (iv)				
Q.5(a)	**Calculate the flexibility coefficients for the beam shown in figure w.r. to the coordinates indicated in figure.**	08	4	3,4	1.1.1 1.3.1 2.4.1
					
Q.5(b)	**Using the calculations made in Q No 5(a) above OR otherwise, find the reactions at B and C in the continuous beam loaded as shown in figure below. Use the force method of analysis only.**	12	4	3,4	1.1.1 1.3.1 2.4.1
					

Q.6(a)	**Analyse the beam shown in figure by slope deflection method and find the end moments. Support C settles down by 15 mm. E = $200x10^6$ kN/m^2, I=$200x10^6$ mm^4.**	**14**	**4**	3,4	1.1.1 1.3.1 2.4.1
					
Q.6(b)	**What are the advantages and disadvantages of indeterminate structures over determinate structures.**	**06**	**4**	2	1.3.1
Q.7(a)	**For the structure shown in figures below determine the degree of (a) static external and internal indeterminacy and (b) kinematic indeterminacy considering and neglecting axial deformations.**	**04**	**3**	3,4	1.3.1 2.1.3
					
Q.7(b)	**The members of the truss shown in figure are subjected to temperature increase of 40^0 C. Calculate the vertical deflection of D due to the increase in temperature. Take $\alpha = 12x10^{-6}$/°C.**	**12**	**4**	3,4	1.1.1 1.3.1 2.4.1
					
Q.7(c)	**What are the conditions to be satisfied during the elastic analysis of indeterminate structures?**	**04**	**4**	2	1.3.1

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Munshi Nagar, Andheri (W) Mumbai – 400058

Re-Examinations February 2024

(2023-24)

Program: T.Y. Civil Engineering (UG) Sem V

Course Code: PC-BTC502

Course Name: Hydrology and Water Resource Engineering

Duration: 03 Hrs.

Maximum Points: 100

Semester: V

Notes:

- Attempt ***any five*** questions.
- Answer to all sub questions should be grouped together.
- **Figure** to right indicates full marks.
- Assume suitable data wherever necessary and state it **clearly**.

Q. No.	Questions	Points	CO	BL	PI
1	(a) Explain hydrological cycle and water budget equation.	10	1	2	1.3.1
	(b) Write short notes on (any two) 1. Unit hydrograph 2. Recording type rain gauges 3. Φ-index and w index.	10	1	3	1.3.1
2	(a)Discuss evaporation process and explain various types of evaporimeters.	10	1	2	1.2.1
	(b) Explain Infiltration process and infiltration indices. Discuss the terms used.	10		2	2.1.2
3	(a)Explain factors affecting runoff and discuss methods of runoff estimation.	10	1	4	3.2.1
	(b)Explain methods of base flow separation and applications of hydrograph in hydrology.	10	1	5	4.1.1
4	(a)Differentiate between confined and unconfined aquifer. State the assumptions involved. Draw neat sketches.	10	3	3	2.4.1
	(b) A 20 cm well penetrates 30m below static water level (ground water table). After a long period of pumping at a rate of 1800 lpm, the drawdowns in the observation wells at 12m and 36m from the pumped well are 1.2 m and 0.50 m, respectively. Determine: (i) the transmissibility of the aquifer; (ii) the drawdown in the pumped well assuming R = 300 m; (iii) the specific capacity of the well.	10	3	4	2.4.1
5	(a) Describe with neat sketch: various forces acting on gravity dam. Explain the terms used.	10	4	2	4.1.1
	(b) Design a regime channel for a discharge of 45 cumecs and silt factor 1.10 using Lacey's theory.	10	4	4	3.3.1

<table>
<tr><td rowspan="2">6</td><td>(a)Define Duty, Delta and Base period and establish a relation between duty (D), delta (Δ) and base period (B)</td><td>10</td><td>2</td><td>2</td><td>7.2.1</td></tr>
<tr><td>(b) Determine reservoir capacity for command area of 25000 Ha. Canal losses 8 % and reservoir losses 10 %. For following data:
<table>
<tr><th>Sr. No.</th><th>Crop</th><th>Base Period Days</th><th>Outlet Factor (Ha/cumecs)</th><th>Intensity of Irrigation (%)</th></tr>
<tr><td>1</td><td>Sugarcane</td><td>360</td><td>1600</td><td>20</td></tr>
<tr><td>2</td><td>Cotton</td><td>180</td><td>1400</td><td>15</td></tr>
<tr><td>3</td><td>Wheat</td><td>120</td><td>1700</td><td>20</td></tr>
<tr><td>4</td><td>Rice</td><td>120</td><td>800</td><td>15</td></tr>
<tr><td>5</td><td>Vegetable</td><td>120</td><td>600</td><td>20</td></tr>
</table></td><td>10</td><td>2</td><td>3</td><td>4.1.1</td></tr>
<tr><td rowspan="2">7</td><td>(a) Describe with neat sketches, various methods adopted for controlling seepage through the body of an earthen dam and through the foundation.</td><td>10</td><td>4</td><td>3</td><td>3.1.1</td></tr>
<tr><td>(b) What is spillway? Where it is used? Explain its various types with suitability.</td><td>10</td><td>4</td><td>3</td><td>3.1.1</td></tr>
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(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examinations December 2023

(2023-24)

Program: T.Y. Civil Engineering (UG) Sem V

Course Code: PC-BTC502

Course Name: Hydrology and Water Resource Engineering

Duration: 03 Hrs.

Maximum Points: 100

Semester: V

24/11/23

Notes:

- Attempt ***any five*** questions.
- Answer to all sub questions should be grouped together.
- **Figure** to right indicates full marks.
- Assume suitable data wherever necessary and state it **clearly**.

Q. No.	Questions	Points	CO	BL	PI
1	(a)Explain different forms of precipitation and characteristics of precipitation in India.	10	1	2	1.3.1
	(b) For a catchment area = 6500 Ha, average inflow = 6.75 cum/sec from surface runoff, and outflow = 7.25 cum/sec, rainfall per month = 160 mm, evaporation = 6.50 cm. Write the water budget equation and find water depth.	10	1	3	1.3.1
2	(a) Explain; various methods to determine average rainfall over a catchment area and discuss their relative merits and demerits.	10	1	2	1.2.1
	(b) Explain Infiltration process, infiltration capacity, modelling infiltration capacity and infiltration indices.	10		2	2.1.2
3	(a) What is hydrograph? Discuss factors affecting runoff hydrograph, components of hydrograph and base flow separation.	10	1	4	3.2.1
	(b)Following ordinates of flood hydrograph were recorded in a stream resulting from a storm in a catchment having an area of 15,400 ha. Base flow is 5 cumecs. Find (i) the runoff depth in cm, and (ii) ordinates of unit hydrograph.	10	1	5	4.1.1
4	(a)Derive an equation for a steady state discharge from a well in an unconfined aquifer. State the assumptions involved.	10	3	3	2.4.1
	(b) A well penetrates fully confined aquifer 10 m thick (saturated thickness) having coefficient of permeability of 0.0005 m/sec. The radius of well is 10 cm. There is a drawdown of 4 m at the well face and its radius of influence is 300 m. Calculate the steady state discharge which can be withdrawn from this well. What will be the percentage increase in the discharge, if the radius of the well is doubled?	10	3	4	2.4.1

Time (hr.)	0	12	24	36	48	60	72	84	96
Discharge (cumecs)	5	10	20	35	30	20	15	10	5

5	(a)Define and explain (i) Consumptive use of water, (ii) field capacity, (iii) frequency of irrigation, (iv) time factor, and (v) capacity factor.	10	2	2	7.2.1
	(b)An irrigation canal has gross commanded area of 95,000 hectares, out of which 88% is culturable irrigable. The intensity of irrigation for Kharif season is 30% and for Rabi season 60%. Find the discharge required at the head of the canal if the duty at its head is 850 hectares/cumec for Kharif season and 1750 hectares/cumec for Rabi season.	10	2	3	4.1.1
6	(a) List the forces affecting the stability of gravity dam and explain how you will determine the various factors of safety against possible failures.	10	4	2	4.1.1
	(b)Design an irrigation channel to carry 60 cumecs, by Kennedy's method. Take m = 1, B/D = 2.50, Manning's n = 0.023 and side slopes 1V: 0.50H.	10	4	4	3.3.1
7	(a)Draw neat sketch of an earth dam and explain various factors affecting failure of an earth dam.	10	4	3	3.1.1
	(b)State different types of spillways and point out suitability and salient features of each type.	10	4	3	3.1.1

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Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

Re Examination

February 2024

Max. Marks: 100 Duration: 3 Hours

Class: T.Y Civil Term V **Semester: V** Program: B.Tech Civil

Organizational Communication and Interpersonal Skills

Course Code : HSM BTC 507

Note:

- **Q.1. is Compulsory**
- **Out of remaining 6 questions attempt any 4**
- **Each question carries 20 marks**
- **Start every question from fresh page.**

Q. No	Answer the following questions:	Grade points	CO	BL	PI
Q.1	Your college is planning to form few technical and non- technical clubs for students. The Student Welfare Committee Chairperson has assigned you the responsibility to discuss with your faculty, Industry personals, Alumni, classmates: CR's of all the branches and submits a detailed report on the type of clubs and the nature of activities they will take up. Present the entire report with recommendations in Memo Format in capacity of General Secretary. **Apply at least 4 procedures to acquire data.**	*20 05 + 15 Format & Content*	*03*	*04*	*10.1.3*
Q.2	Apply for the position offered by "Shine International groups' ltd'. Write a cover letter and a detailed Resume for the job position given below. (Invent necessary details) Selected Engineer's Day-to-day Responsibilities Include • Execution Planning of all the site civil related works - Earthwork / Civil work/ Footing Foundations, /JCB/ Dozers, etc., • Ensuring the quality of construction Materials • Project work scheduling and maintaining the project Deadlines	**20 05+ 15 Cover letter & Resume**	**02**	**04**	**10.1.1**

	• Project execution co-ordination with Consultants, Surveyors, Vendors, Management, etc., • Responsible for inventory storage of materials on the site. • Preparing daily reports on closing stocks, labor attendance tasks done, etc. • Administrative area: Budgets / indents / review, etc. • Weekly submission of bill book, petty cash accounts with respect to the site works. • To receive materials submit necessary documents for the same. • Fix Agenda for review meetings, etc. Desired Candidate Profile • B.Tech in Civil engineering • 0- 2 years of Experience as a Civil/Site Engineer • Intermediate knowledge required on AutoCAD, GIS and MS office Role Construction-Construction Management Industry Type Engineering Construction Functional Area Site Engineering, Project Management Employment Type Full Time, Permanent Role Category Site Engineering Education UG : B.Tech /B.E. in Civil				
Q.3.	The All-India Council of Technical Education has appointed a ten-member committee to study the quality of technical education in the country and its relevance to the social needs and national requirements under NEP 2020. In its 8th Meeting held at 4 p.m. on 25 November, 2022 at Manikchand Bhavan. Netaji Marg, New Delhi-110006 this committee transacted the following business: 1. Confirmation of minutes of the previous meeting 2 Revision of courses with reference to Industry 5.0 3. Identification of the points Like lab facilities, Equipment, Course, on which information to be sought from institutions 4 Provision of compulsory internships to be provided to third year students 5 Constitution of four sub-committees for personal interaction with engineering colleges 6. Selection of courses across branches 7. Any other matter with the permission of the chairman. 8. Date for the next meeting **Assuming you to be the secretary of the review committee, Draft the Notice, Agenda, and Minutes for the above meeting.**	**20** **06+ 16** **Notice Agenda & Minutes**	**01**	**01**	**10.3.1**
Q.4.	**A.** As the student of third year civil branch draft an email to OCIS faculty informing about the progress of your book report and briefly describing the summary of the report. Keep the Principal in CC and Dean Academics in BCC. **B.** Your friend is new to professional email writing. Explain in detail the do's and don'ts of an email.	**12 + 08**	**04**	**03**	**12.1.1**

Q.5	Tarun had to select a suitable candidate from a pool of applicants for the post of research and training associate. He shortlisted seven applicants and called them for GD. The GD was a chaos. The participants argued with one another unnecessarily and displayed poor listening skills. There were disagreements on virtually every point, and some participants held parallel conversations. The GD overshot the time allotted and did not reach any conclusion. Despite the chaos, Tarun could mentally figure out two candidates Sadhana and Asha- were better than the others and were superior in terms of ideas they had to offer. Sadhana and Asha were called for a first interview before interviews with the HR team. Since the post required persons who were relatively fresher's, Tarun prepared to ask four questions. This was how Sadhana's interview went: Question1: Tell me something about yourself. "Hi, sir. I am Sadhana from Bangalore and currently just out of college. 15 05 02 I have done my graduation in commerce from ABC college with 67 percent marks and have done most of my studies from Bangalore. I have participated in many cultural activities and organized college events. My parents hail from New Delhi, although we have settled in Bangalore for more than 15 years now. They are both employed in government service. As far as my interest goes. I love to play Badminton and hockey. I am fond of watching TV and movies in particular. Although the marks I have got throughout school and college have been in first class, I could not focus much due to my illness. During my school and college days I participated in many events and organized events. Question 02. Why do you think you qualify for this job? 'Sir, I am a very passionate trainer and am able to communicate to people very clearly. Training is something which is very close to my heart. I have taught many people, mostly at home, and I find that this is the only career that I am interested in. I am now singularly focused upon building my career in the field of training. Also, the post, I believe, is based out of Bangalore, and it is also a good enough reason for me to apply, as I would get a chance to stay close to my family.' Question 03. What do you know about the nature of training and development we provide? 'Sir, I am not aware of the training and development your company provides. But what I gathered from other sources is that you have a training center for employees at Gurgaon and a research center at New Delhi.' Question 4. Do you have something to ask? Sir. May I ask you, what would be the remuneration for the position I have applied for? This is how Asha's interview went:	**20** **10+** **10**	**02**	**01**	**10.3.** **2**

Question 1. Tell me something about yourself.

'I am from Hyderabad and have currently completed my final year of graduation and I am waiting the results. I have scored more than 70 percent throughout my career. I have been a good performer at the college and school levels. Apart from this, I have participated in many extracurricular activities, both at the school and at the college and have a couple of accolades, which are listed in my resume. Throughout my career I have financed my own education from the fee that I earned by assisting and nurturing students recognize their own potential. I have also provided career counselling to many students and found my interest in that field.

Question 2. Why do you think you qualify for this job?

'As I mentioned, I self-financed my studies and have provided training and coaching to many students. I have also provided career counselling, which has helped me to realize my potential. Moreover, my performance in my examinations has demonstrated my capabilities as a student and my ability to advance the cause of education and training. Although I have professionally not done any rese4arch, i have been involved with my faculty in helping them with their research work. The work done by my faculty members has been published in international journals, and I have been credited for the work that I have done. I feel that this is an area which interests me and I would be interested in doing more of research.'

Question 03. What do you know about the nature of training and development we provide?

'Sir, your company is one of the leading providers of training and education to its employees. It is also globally renowned for its ability to leverage the expertise of providing cutting-edge knowledge to its employees. The investment in training in your company has been growing over the years, which can be easily seen in the company reports. The company feels that employees can deliver better and provide improved services if they are kept updated about the best and the most recent practices. The above has been mentioned by the CEO in the recent Indian Leader Summit. The Globe award which you have received validates the company's capability to further the cause of training.'

Question 4. Do you have something to ask?

'What are your expectations from the candidates that you select?

Asha leaves, thanking Tarun for his time and for giving her an

	opportunity to be interviewed. Tarun now has to choose between the two candidates. He records his comments and sends a report to HR team. ***QUESTIONS:*** ***1.*** **Who you think is a better candidate? What makes the candidate stand out?** **2. What were the mistakes made by the candidate who is inferior to the other? How could she have done better?**				
Q.6.	Jyothi's concepts are clear and her reasoning is sound, but in the feedback to her presentations, the audience often says that she is very feeble. You just cannot hear her beyond the first two rows. She has also not made her PowerPoint slides properly. You want to see Jyothi improve the quality of delivery of her presentations, as you feel this is a critical skill needed going forward. What suggestions would you give her regarding Content, Visual Aids, Delivery and Speaking Skills, Body language and Attire?	**20**	**04**	**05**	**10.3.1**
Q.7.	**Answer Any Two Questions out of six.** Q.1. Differentiate between a leader and a Boss. Explain the six different leadership styles with an example each. Q.2. Explain in detail Stephen Covey's Time Management Quadrant. What are the different techniques to be adopted for utilizing time effectively? Q.3. "***Stress management*** helps in leading a happier and healthier life". What are some psychological and emotional signs of stress? Q.4. Describe in detail the different types of team members. How are conflicts resolved in teams? Q.5. Describe in detail the eight leadership skills that the leader should possess. Q.6. Explain these six time management skills. Identify the time wasters in your life and describe what methods should be adopted for effective time management.	**20** **10 + 10**	**04**	**05**	**12.1.2**

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Exam

December 2023

Organizational Communication & Interpersonal Skills

Max. Marks: 100 Duration: 3 Hours

Class: T.Y. Civil **Semester: V** Program: BTech

Course Code : HSM BTC 507

Note:

- *Question 1 and Question 2 is Compulsory*
- **Out of remaining 5 questions attempt any 3**
- **Each question carries 20 marks**

Questions	Answer the following questions:	POINTS	CO	BL	
Q.1.	A Company named Pixel Pioneers is considering a proposal to establish a new factory in your town. The **Managing Director** has asked you to write a report on the suitability of the place for the establishment of this factory. For this report an outline has been provided below. Study it carefully and prepare a letter report in the capacity of Senior Civil Engineer consultant of a Professional Builders & Installers Inc., Cama Lane, Grant Road Mumbai. Write the complete report in Letter Format. **Establishment of a new Factory** **Outline** 1. Introduction 2. Area and Land availability 3. Market availability 3.1. Potential 3.2. General 4. Labour from local and other plants 4.1. Raw Materials 4.2. Cost 4.3. Transport facilities 4.3.1. Rail, Road, Air 4.3.2. Residential Buildings 4.4. Accessibility 5. Education and communication facilities 5.1. Telephone networks	**20**	**01**	**05**	

	5.3. Games and films 6. Conclusion 7. Recommendations.			
Q.2	Imagine that you are the secretary in attendance at the 3rd meeting of your department of Civil Engineering at Sardar Patel College of Engineering. A meeting has been called by the Head of department to discuss issues related to Students Attendance in lectures and Practical, Increasing the college working hours, Compulsory Internships, Gate Classes, Monthly technical activities of civil department, Visits for awareness in the field, Introduction to new courses, Date for next meeting.	**(20)**	**03**	**03**
A.	Write a Notice and agenda for the meeting taking the above items.	**(10)**		
B.	Assuming the meeting is conducted, prepare the minutes of the meeting.	**(10)**		
Q.3. **A.**	"A job interview is not only the situation in the business world when you would be appearing for an interview". Explain the different situations when you appear for interviews. What does an employer look for in an interviewee?	**(10)**	**02,3**	**02, 03**
B.	Describe briefly the types of group discussions with examples. Explain the points one should bear in mind for effective participation in the group discussion	**(10)**		
Q.4. A	Draft a Job Application Letter for the Job opening mentioned below.	**(10)**	**01,02**	**01**
B.	Prepare a detailed resume for the post mentioned. Wipro Eligibility Criteria for Fresher's 2024 • Candidates should have 60% throughout their academics. • Students from Students who have completed Graduation and Graduation in BE, B.Tech or 5 Year Integrated M.Tech. • All Engineering Branches are Eligible. **Education Criteria** • Maximum 3 years in education gap ,if any, is allowed between 10th and graduation. • Candidate should have done a full degree course recognized by the Central/State Government of India. **Other Important Criteria** • Students applying in Wipro must be Indian citizens or should carry a PIO or OCI card, in case holding a passport of any other country. • Candidate should have done a full degree course recognized by the Central/State Government of India	**(10)**		

	Students should be proficient in Microsoft, Canva, Matlab and C programming software.				
Q.5.	Your best friend's concepts are clear and her reasoning is sound, but in the feedback to her presentations, the audience often says that she is very feeble. You just cannot hear her beyond the first two rows. She fumbles with words during presentations. She has also not made her PowerPoint slides properly as she has not read any rules for preparing PowerPoint presentations. You want to see her improve the quality of delivery of her presentations, as you feel this is a critical skill needed for going forward and achieving success as an engineer. • What suggestions would you give her for presentations regarding improvement in the Content, Delivery? (10) • Body Language, and the visual aids to be used. (10)	**(20)**	**01, 03**	**04**	
Q.6. A.	Attempt any ***Two questions out of Six.*** Each question carries Ten marks: i. Prepare a detailed swot analysis in the quadrant for the Placements for Engineering students in SPCE. ii. Define Time Management. Explain in detail Stephen Covey's Time Management Matrix. iii. Differentiate between a leader and a Boss. Explain the six different leadership styles with an example each. iv. "***Stress management*** helps in leading a happier and healthier life". What are some psychological and emotional signs of stress? v. Define reports. Explain contents of a report. vi. Define a team. What are the types of teams? Differentiate between a group and a team.	**(20)**	**01,04**	**01**	
Q.7. A.	Multiple Choice questions: Each question carries 02 marks **1. Business Etiquette_____** a. Ensures a business communicates with all the proper people b. Is a guide to personal success c. Helps a business avoid civil rights complaints d. Ensures a professional business environment is maintained. **2. You are running 15 minutes late to a meeting with a client. What should you do?** a. Stop what you are working on and leave for the meeting immediately b. The client is your friend, he will wait as long as you want c. Your client won't mind waiting, 15 minutes is acceptable. d. Call the client and tell him that you will be there in few minutes.	**(10)**	**04**	**03**	

	3. Your boss shows up late to a meeting that is about to conclude. You should: a. Thank her for stopping by; politely interrupt the person speaking at the meeting and debrief your boss on the agenda. b. Slightly nod when she enters but continue with the meeting without bringing her up to speed. c. once the session is over tell her politely that it is a bad practise to show up late for the meeting. **4. It is casual Friday, but you have a meeting with a client. How should you dress that day?** a. casually b. A little nicer than usual, but nothing too formal c. In your Suit d. In business casual **5. You invite an Out-of-Town client to dinner to discuss work, you should:** a. Take them to your favourite restaurant with a sports bar b. Take them to an upscale French restaurant with a romantic ambience. c. Ask for their preference and pick an appropriate restaurant. d. Invite the client to your office and order the food at the desk.					
Q.7. B.	You find out that many of your team members are not adhering to the professional etiquettes to be followed in an organization. They are spending too much time gossiping and spreading negative approach. You need to speak to them immediately. How would you approach the issue and what professional etiquette tips would you like to give them. List 10 must professional etiquette.	**(10)**				

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

RE - EXAMINATION JAN. - 2024

Program: T. Y. B. Tech. Civil Sem V

Duration: 3 Hour

Course Code: PC – BTC - 504

Maximum Points: 100

Course Name: Highway Engineering

Semester: V

Notes:

1. **Question 1 is compulsory**
2. **Solve any 4 Questions from remaining 6 questions**
3. **Assume suitable data if required**
4. **Draw the neat sketch if required**

Q.No.	Questions	Points	CO	Module No.
Q.1.				
a	Write short note on Ist - 20 years Road Development Plan	05	01	01
b	Discuss with sketch about road marking	05	02	03
c	Discuss with neat sketch different types of camber	05	02	02
	Discuss the importance of drainage in Highway Engineering	05	03	05
Q.2.				
a	Write short notes on Jaikar Committee	04	01	01
b	Discuss the different mode of transportation and its suitability	08	01	01
c	The area of the certain district in India is 23, 400 km^2, the number of towns as per 2001 census is 17. For a road density of 82 km per 100 km^2 area, calculate the length of various categories of Road as per third 20 year's road development plan	08	02	01
Q.3.				
a	Discuss the basic requirement of an ideas alignment.	04	01	01
b	Explain with sketch the various factors controlling alignment of roads.	08	01	01
c	What are the objectives of reconnaissance survey for construction of new Road. Also, discuss the information you will collect in reconnaissance report.	08	02	01

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RE - EXAMINATION JAN. - 2024

Q.4.				
a	state the objectives of providing extra widening on horizontal curve	04	01	02
b	Discuss the importance of geometric design of highway. List the geometric elements to be considered in highway design.	08	01	02
c	Discuss the field procedure for elimination of camber and introduction of super elevation.	08	01	02
Q.5.				
a	Explain PIEV Theory	04	01	02
b	What are the objectives of providing transition curve on horizontal curve. How will you decide the length of transition curve.	08	01	02
c	Calculate the overtaking sight distance for a National Highway passing through plain area. Assume all other data as per recommendation of IRC. Also, calculate (i) The minimum length of overtaking zone. (ii) Draw a neat sketch of overtaking zone and show the position of sign post	08	01	02
Q.6.				
a	Discuss with sketch Intersection at Grade	04	01	03
b	State the assumption made in Burmister theory. Also, state the deflection equations used for design of single layer and two layer pavements.	08	02	04
c	Explain IRC approach for pavement design as per Indian Practice code IRC 37-1984	08	02	04
Q.7.				
a	enlist at least ten road marking recommended by per IRC	10	1	3
b	Write short notes on i. Method of conducting preliminary survey ii. Steps for construction of lime stabilised earth road	10	2	5

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END SEM EXAMINATION, JAN. - 2024

Program: Civil Egineering T.Y Sem V

Course Code: PC –BTC – 504

Course Name: Highway Engineering

Duration: 3 Hr

Maximum Points: 100

Semester: - V

Notes:

1. **Question 1 is compulsory**
2. **Solve any 4 Questions from remaining 6 questions**
3. **Assume suitable data if required**
4. **Draw the neat sketch if required**

Q.No.	Questions	Points	CO	BL	Module No.
Q.1.					
a	Differentiate between flexible pavement and rigid pavement	07	1	1	04
b	Discuss the term Vehicle damage factor and recommended value for design of road in plain and hilly area	07	2	2	04
c	Explain with sketch the various factors controlling alignment of roads.	06	1	1	01
Q.2.					
a	State the equations for calculation of extra widening on horizontal circular curve. Also, draw the neat sketch showing the extra widening of road in curve portion.	07	1	2	02
b	The two lane national highway meet another two lane national highway. The radius of horizontal curve at intersection is 500 m. the maximum length of wheel base of the vehicle passing on these road is 6 m. Calculate the extra width of pavement required on horizontal curve. Also draw the neat sketch showing extra widening on curve.	07	1	3	02
c	Draw the cross section of road in embankment and Discuss the term carriageway width and shoulder.	06	1	2	02
Q.3.					

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END SEM EXAMINATION, JAN. - 2024

a	State the Westergard equations for calculation of wheel load stress at edge, interior and corner region of the rigid pavements.	05	2	1	04
b	Calculate the total thickness of pavement as per original CBR method given by California Division of Highway for wheel load of 4085 kg and tyre pressure of 7 kg/cm^2, Assume CBR value of subgrade soil is 5 %.	05	2	2	04
c	The two lane, single carriageway road carries a traffic of 900 cvpd in both direction and rate of growth of traffic is 7 %. If the CBR value of subgrade soil is 5 % and time required for construction of road after last count is 3 years. Calculate the total thickness of Flexible pavement passing through (i) plain area (ii) hilly area (use IRC 37 – 2001 Design chart)	10	2	3	04
Q.4.					
a	Derive the Expression for stopping sight distance	06	1	1	02
b	How will you calculate the temperature stress as per Westargard approach	06	2	1	04
c	An ascending gradient of 1 in 25 meet another ascending gradient of 1 in 100, if the height of driver's eyes and height of object above road surface is 1.1 m and 0.20 m respectively. Find the length of summit curve to provide the required sight distance (stopping sight distance) for a design speed of 75 km / hr.	08	1	3	02
Q.5.					
a	Discuss with neat sketch overturning effect and skidding effect	07	1	1	02
b	Two lane national highway passing through a plain area has radius of horizontal curve is 500 m. calculate the length of transition curve. Assume rate of introduction of super elevation is 1: 150, pavement rotate @ its inner edge and maximum length of wheel base is 7 m.	07	1	3	02

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END SEM EXAMINATION, JAN. - 2024

c	A two lane road with design speed of 70 km/hr has a horizontal curve of radius 400 m. designs a super elevation; also calculate the value of equilibrium super elevation.	06	1	2	02
Q.6.					
a	Enlist ten regulatory signs	05	2	1	03
b	What is camber and its type? Enlist the objectives of providing camber to the carriageway	07	1	1	02
c	Discuss with neat sketch about road marking	08	2	1	03
Q.7.					
a	Discuss the step by step procedure for construction of Rigid pavements	10	2	2	05
b	How will you construct the WBM type base layer of the flexible pavements	10	3	2	05

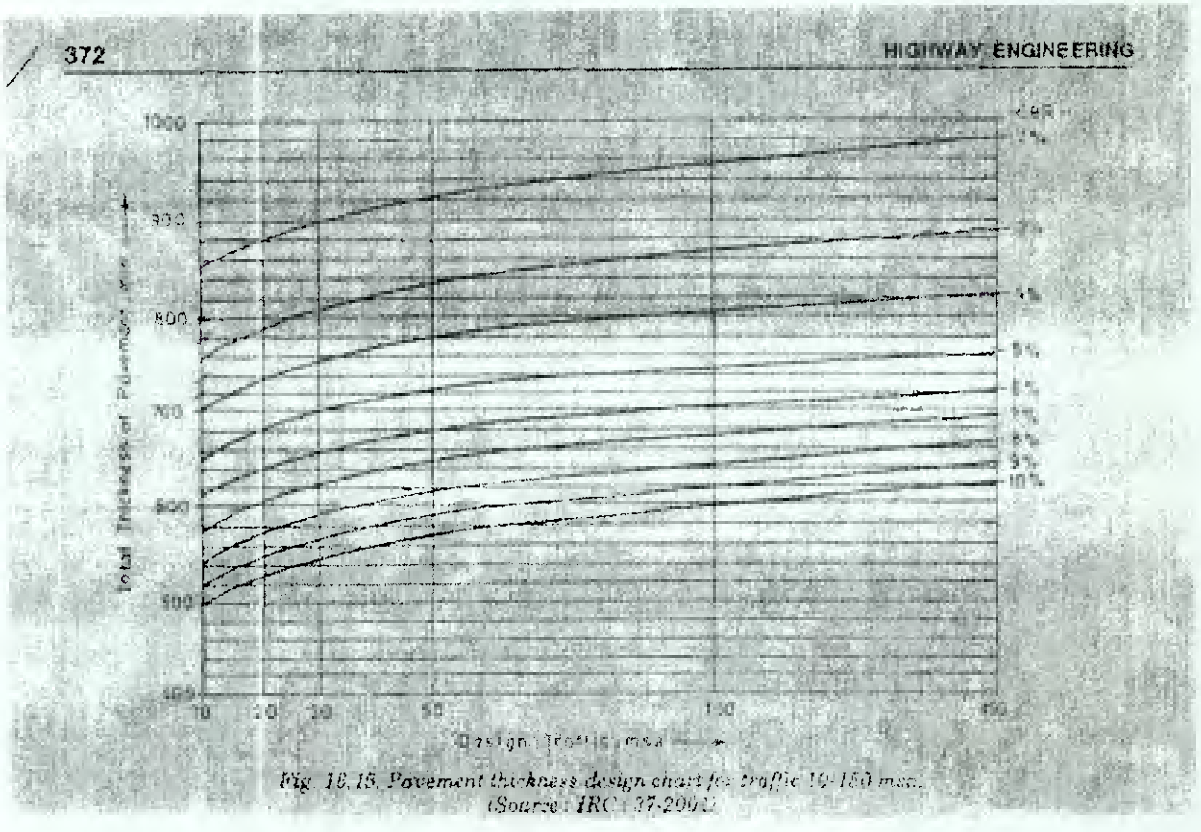

Fig. 16.15. Pavement thickness design chart for traffic 10-150 msa.
(Source : IRC : 37-2001)

Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)
Munshi Nagar Andheri (W) Mumbai 400058

Reexam
Feb 2024

Max. Marks: 100 **Duration: 3 Hrs**

Class: TY B. Tech Civil Sem V **Semester: V**

Name of the Course: Environmental Engineering II **Program: B. Tech Civil**

Course Code: PC BTC 506

Instructions:

- **Question 1 is compulsory and Attempt any four questions out of the remaining six**
- **Draw neat sketches/diagrams wherever required**
- **Assume suitable data if necessary and state them clearly**
- Figure on right indicate **maximum points** for the given question, **course outcomes attained, Bloom's Level** and **Performance Indicators**

Q1	**Answer the questions**	**Points**	**C-O**	**BL**
(a)	**Choose the right choice and give reasons/solutions for the same neatly. Just putting the right choice will not get you points.**		**2-4**	**1-4**
(A)	The average annual daily flow of a city is 200 lpcd. The maximum daily and maximum hourly flow of the city, assuming maximum daily flow and maximum hourly flow is 2 times and 3 times of annual average daily flow on any day, respectively are: i. 0.025 m^3/hr and 0.01667 m^3/hr ii. Both are 0.025 m^3/hr iii. 0.01667 m^3/hr and 0.025 m^3/hr iv. 0.0083 m^3/hr and 0.01667 m^3/hr respectively	**(02)**		
(B)	BOD/COD ratio of a wastewater sample will usually be: i. Greater than One ii. Less than One iii. Equal to One iv. Zero	**(02)**		
(C)	In the experiment of winkler's method for DO determination the color of precipitates formed is i. white ii. Yellowish brown iii. White or Yellowish brown depending on conditions iv. buff red	**(02)**		
(D)	The average flow in a municipal wastewater treatment plant is 5000 m^3/day. Determine the approximate diameter of a circular primary clarifier to remove suspended solids at average flow. Assume overflow rate of 30 m/day and a depth of 3 m. i. 5.5 m ii. 14.5 m iii. 10.4 m iv. 28 m	**(02)**		
(E)	What is the headloss through a bar rack with an approach velocity of 0.60 m/s and velocity through the screen of 0.94 m/s? i. 38 mm ii. 3.80 mm	**(02)**		

	iii. 5.40 mm iv. 0.54 m/s			
(b)	Explain various types of sewerage system and different types of waters (black, grey and Brown water)	**(10)**	**1-4**	**2**
Q2	**Answer the following questions:**	**(20)**		
(a)	Rajouri district in J and K has a population of 7,10,000 (water supply rate is 100 lpcd; sewage conversion factor is 0.75). The drainage area of this area is 20 sq km and run off coefficient is 0.5 on an average. The time of concentration is 30 min, find max runoff using intensity of rainfall as I= {900/(t+60)}. This area has a sandy soil and a low water table (1 m depth). Design the sewer line giving checks. The characterization of the wastewater indicates high sulphates and chlorides in the sewage. Explain which material should be chosen as the sewer material and criteria for selection of sewer material and what can be the possible problems that can occur due to high sulphates and chlorides.	**(10)**	**1-4**	**4**
(b)	Explain methods to dispose sewage with figures	**(10)**	**3**	**1-2**
Q3	**Answer the following questions:**	**(20)**		
(a)	Explain the need to study public health engineering	**(05)**	**2**	**2,3**
(b)	Derive equation for 1st stage BOD. The dilution water (CONTROL) has initial DO of 7.5 mg/L and the diluted sample from Tawi has DO 7.0 mg/L. The dilution for BOD sample is 2%. After 5 days at 20°C DO in diluted sample falls to 3 mg/L and that of Control is 6.3 mg/L. Find BOD_5 of sample at 20°C. The K_{10} value is 0.1/days. Find the BOD of same sample at 27°C at the end of 2 days. θ= 1.056	**(10)**	**1-3**	**3-4**
(c)	Explain relative stability and population equivalence	**(05)**	**3**	**1-2**
Q4	**Answer the following questions:**	**(20)**		
(a)	A design engineer needs to design a wastewater treatment plant for a sewage generating from Rajouri. The domestic wastewater to be treated has initial BOD of 200 mg/L and S.S. concentration of 230 mg/L. Find the BOD loading and Suspended solids loading. Illustrate the basic flowsheet of wastewater treatment plant that can be proposed with function of each unit and expected reduction in BOD. Will the efficiency of the plant be as required If the treated wastewater is to be reused as process wastewater for construction, list the additional units required.	**(10)**	**1-4**	**1-5**
(b)	A per capita water demand of a township in Rajauri is 170 LPCD having total population of 70000 persons. The sewage generated from this town is required to lift for 15 m of static head and 120 m distance. Consider loss of head in bends and valves of 0.3 m. Determine (a) size of the sump well, (b) horsepower required for the pump, (c) diameter of the rising main. Assume suitable data required. Assume velocity in rising main as 1m/sec. Take efficiency of pump 65% and motor as 75%.	**(10)**	**3-4**	**4-5**
Q5	**Answer any two of the following questions:**			
(a)	Explain with short notes (1) Oxidation Ditch (2) Rotating biological contactor(3) Oxidation Pond	**(10)**	**1-2**	**1**
(b)	In a treatment plant in Rajauri trickling filter is used as the secondary treatment. As a consultant do you think it is better option to opt for trickling filter rather activated sludge process? State advantages and disadvantages	**(10)**	**1-4**	**1-5**

	Determine the size (dia and depth) and numbers of high rate trickling filter to be provided for the following data. (i) Sewage flow = 20 MLD (ii) Recirculation ratio = 2 (iii) BOD_5 of raw sewage = 200 mg/lit (iv) BOD_5 removal in PST = 35% (v) Final effluent BOD_5 desired = 20 mg/lit Also calculate hydraulic loading and organic loading.			
(c)	In an alternative treatment plant in Rajauri activated sludge treatment is provided as biological treatment. Design a continuous flow completely mixed activated sludge process with following data. Sewage flow 6000 m^3/d; Influent BOD = 210mg/L; Effluent BOD= 24 mg/L;; MLSS= 3000mg/L; MLVSS/MLSS=0.8; Return sludge concentration as SS= 15000mg/L; Y= 0.7; k_d= 0.05d^{-1}; θ_c=12days. Compute oxygen requirement also. Give all checks	**(10)**	**1-4**	**4-5**
Q6	**Answer the following questions:**	**(20)**		
(a)	A hostel is provided near Rajauri and has population of 200 residential graduates. Design septic tank with water demand of 160 lpcd. Design trenches (no and size) considering percolation rate as 20 min per cm. Please sketch the same	**(10)**	**3**	**4-5**
(b)	Why sludge should be treated. For Rajauri, design a conventional digester for mixed primary and activated sludge from 20,000 m^3/d Data given is Raw effluent SS= 250 mg/L SS removal efficiency = 60% SS concentration in primary sludge = 25 kg/m^3 Excess activated sludge = 3000 kg/day SS concentration in activated sludge = 10 kg/m^3 VM in Mixed sludge = 60% Destruction of volatile matter = 70%	**(10)**	**3**	**5**
Q7	**Answer any four the following questions:**	**(20)**		
(a)	Problems in activated sludge process	**(05)**	**2**	**1**
(b)	Anaerobic digestion	**(05)**	**2**	**1**
(c)	Sludge dewatering and drying	**(05)**	**2**	**1**
(d)	Reuse of wastewater	**(05)**	**3**	**1**
(e)	Laying of sewers	**(05)**	**2**	**1**

Formula Sheet :

$$V_S = \frac{\rho_w g (Ss-1) d^2}{18\mu}$$

Or $$V_S = \frac{g (Ss-1) d^2}{18\upsilon}$$

$$Q_{max} = \left(1 + \frac{14}{4 + P^{0.5}}\right) Q_{av} \qquad F = \frac{1+R}{(1+R/10)^2} \qquad Qw = \frac{VX}{\theta_c Xr}$$

Or V_S = 418(Ss-1)d^2 (T+10)/60

V_c = 3 To 4.5 √(g d (Ss – 1))

$v_c = \sqrt{\frac{8\beta g(S_s - 1)d}{f}}$ $E_2 = \frac{100}{1 + \frac{0.4432}{1 - E_1}\sqrt{\frac{w_2}{VF}}}$

$\cos\frac{\theta}{2} = \left(1 - \frac{2d}{D}\right)$

I=a/t^n; I=a/(t+b)

Y=0.5√ B

R=A/P

Q=A.V

$\frac{W_s}{S_s} = \frac{W_f}{S_f} + \frac{W_w}{S_w}$

Vs= [0.707(Ss-1)$d^{1.6}$ $\upsilon^{-0.6}$]$^{0.714}$

$\eta = 1 - \left(1 + \frac{n(v_s)}{Q/A}\right)^{-\frac{1}{n}}$ $q = \frac{Q}{A}$

BHP = (w.Q.H)/(75.η_p. η_m)

$\frac{Qr}{Q} = \frac{x_t}{\left(\frac{10^6}{svi} - x_t\right)}$

Conc (µg/m^3)=$\frac{ppm*MW*1000}{22.4}$

$\theta_i = \frac{V.x}{(Q+Q_r)x - Q_r x_r}$

$Volume = \left[Vf - \frac{2}{3}\left[V_f - V_d\right]\right]T_1 + V_d T_2$

$Volume = \frac{1}{2}\left[V_f + V_d\right]T_1 + V_d T_2$

• $\frac{1}{\theta_c} = \frac{Q}{V}(1 + r - r\frac{Xr}{X})$ $U = \frac{Q*(So-S)}{V*X}$ $T = \frac{La}{20} - 1$

A=0.00622.q/V_r; h_L=0.0729(V^2-v^2) v=Q/W*d $\frac{W_s}{S_s} = \frac{W_f}{S_f} + \frac{W_w}{S_w}$

Q = C.I.A / 360

I = 760 / (t + 10) $V = \frac{1}{n} * R^{\frac{2}{3}} * S^{\frac{1}{2}}$

I = 1 020 / (t + 10)

$V = 0.849 C_H R^{0.63} S^{0.54}$ $\frac{F}{M} = \frac{S}{\theta * X}$ $S_R = 100(1 - 0.605\ ^{t}/_{37})$

$t_0 = \frac{d^2(0.011d + 0.785H)}{Q}$ $U = \left(\frac{F}{M}\right)*\left(\frac{E}{100}\right)$ $Ns = \frac{3.65n\sqrt{Q}}{H^{0.75}}$

$PE = \frac{BOD\ load\ from\ industry\ \left[\frac{kg}{day}\right]}{0.054\ \left[\frac{kg}{inhab \cdot day}\right]}$ $E = \frac{\left(S_0 - S\right)}{\left[\frac{kg}{day}\right]^3} * 100$

$L_t = L_o(10^{-Kt})$ x=xa+xe+xi

$E_i = \frac{100}{1 + 0.4432\sqrt{\frac{w_1}{VF}}}$

$\theta_c = \frac{V*x}{Q_w x_w + Q_e x_e}$ $BOD5 = (DO_{1s} - DO_{5s}) * dilutionfactor - (DO_{1b} - DO_{5b})$

h_f=flv²/(2gD)

$V_{sl} = \frac{W_s}{\gamma_w S_{sl} P_s}$

$U = \frac{Q*(So-S)}{V*X}$ O_2 (g/d) = $\frac{Q(S_o - S)}{f}$ - 1.42 $Q_w X_r$

$\theta_S = \frac{V_s}{Q}$ $\frac{f}{m} = \frac{So*Q}{V*X} = \frac{So}{\theta*X}$ $y_t = L_o(1 - 10^{-Kt})$

Q= 130/√t (lpd/m^2)

12 to 25 min/cm

25-50% 0.3-0.6kg/m^3/d

4-8 hrs	n=0,1/8,1/4,1/2,1	1.8-3m; 1 to 4 m^3/d/m^2; 0.08-0.32kg/m^3/d
50 – 150 ml/gm	ML= 90 m MW= 30 m L:W= 1.5:1 to 7.5:1 L:D= 5:1 to 25:1 D= 3 to 50 m; 7.5-10% D= 2.5 or 3.5	0.9-2.5m; 10-40m^3/m^2/d; 0.32-1 kg/m^3/d 0.6-1.6kg/d/m^2 6-35 m I.6-6.4 kg/d/m^2 1 in 6 to 1 in 10 10-20 days 1.2 to 2 m 30- 40 days 4.5 to 6 m and maximum 9m 0.9 m^3
0.7-1.2 m/s	125m^3/d/m 185m^3/d/m	0.1 to 0.15per capita with dry solid loading of 80 to 120 kg/m^2/year 0.2 0.175 -0.2 m^2/c/yr area or 60-120 kg/m^2/yr
0.2-0.4/day	25-35 m^3/m^2/d; 50-60m^3/m^2/d	$Q\ max = \frac{5Q_{av}}{P^{0.2}}$ $Q_{max} = \left(1 + \frac{14}{4 + P^{0.5}}\right)Q_{av}$
5-15 days	15-35 m^3/m^2/d; 40-50m^3/m^2/d	$Q = 10^4 A * I * \frac{Ri}{1000 * 3600}$

Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)
Munshi Nagar Andheri (W) Mumbai 400058

End Semester Examination

December 2023

Max. Marks: 100 **Duration:** 3 hrs

Class: B. Tech **Semester:** V

Name of the Course: Environmental Engineering II **Program:** TY BTech Civil

Course Code: PCBTC506

Instructions:

- **Attempt any 5 questions**
- **Draw neat sketches/diagrams wherever required**
- **Assume suitable data if necessary and state them clearly**
- Figure on right indicate **maximum points** for the given question, **course outcomes** attained and **Bloom's Level**

Q1	**Answer the following questions:**	(20)	CO	BL
(a)	Explain difference between greywater , blackwater and yellow water. What should be the treatment strategies adopted for each type of wastewater	(05)	2	3
(b)	The Run off coefficient is 0.6 on an average for a region of 50 hectares of Anand District. The time of concentration is 30 min, find max runoff using intensity of rainfall as I= {900/(t+60)}. Design storm water drain (Trapezoidal section)	(05)	2	4
(c)	The characterization of the wastewater indicates high hardness and chlorides in the sewage. Explain which material should be chosen as the sewer material and criteria for selection of sewer material and what can be the possible problems that can occur due to high chlorides. Explain sewer appurtenances likely to be used for this sewer line with sketch and why?	(10)	2	3
Q2	**Answer the following questions:**	(20)		
(a)	Explain sewage disposal on land. When will you adopt sewage use for irrigation and how sewage can be used for irrigation (all methods)	(10)	2	3
(b)	Explain concept of BOD and COD and how is it used in present treatment plants. Which BOD is important for environmental engineer. The diluted sample from a river from Anand has DO 8.0 mg/L. The dilution for BOD sample 2%. After 5 days at 20°C DO in diluted sample falls to 3 mg/L and that of Control is 7.8 mg/L and intial control had DO of 9 mg/L. Find BOD_5 of sample at 20°C. The K_{10} value is 0.1/days. Find the BOD of same sample at 40°C at the end of 2 days. θ= 1.056	(10)	1-3	4
Q3	**Answer the following questions:**	(20)		
(a)	Design engineer of Anand needs to design a wastewater treatment plant for a sewage generating from population of 6,00,000 and water demand of 100 lpcd . The domestic wastewater to be treated has initial BOD of 200 mg/L and S.S. concentration of 210 mg/L. Find the BOD loading and Suspended solids loading.(mass loadings) Illustrate the basic flowsheet of wastewater treatment plant that can be proposed with function of each unit and expected reduction in BOD. What is to be done to reuse the wastewater for potable or non potable purpose. Further what will be the relevant standards to check for the same.	(20)	1-4	4
Q4	Answer the questions	(20)		

(a)	In the wastewater treatment plant of Anand area , trickling filter is used as the secondary treatment. State various types of sewage filters available Determine the size (dia and depth) and numbers of high rate trickling filter to be provided for the following data. (i) Sewage flow = 8 MLD (ii) Recirculation ratio = 2 (iii) BOD_5 of raw sewage = 200 mg/lit (iv) BOD_5 removal in PST = 30% (v) Final effluent BOD_5 desired =30 mg/lit Also calculate hydraulic loading and organic loading.	(10)	3-4	4
(b)	In an alternative treatment plant activated sludge treatment is provided as biological treatment. Design a continuous flow completely mixed activated sludge process with following data. Population =6,00,000 water supply rate = 100 lpcd; Influent BOD to aeration tank =140 mg/L; Effluent BOD= 20 mg/L; Effluent SS 20; MLSS= 3500mg/L; MLVSS/MLSS=0.8; Return sludge concentration as SS= 15000mg/L; Y=0.7; k_d=0.05d^{-1}, θ_c=10days. Compute oxygen requirement also. Give all checks and compute r, f/m, VLR and other important parameters in design	(10)	3-4	4
Q5	**Answer the following questions:**	**(20)**		
(a)	A hostel is provided near Anand and has population as mentioned in 250 residential graduates. Design septic tank with water demand of 100 lpcd. Initial BOD is 120 mg/L. Design and draw dispersion trenches (no and size) considering percolation rate as 20 min per cm.	(10)	3-4	4
(b)	For your area, design a conventional digester for mixed primary and activated sludge from the flow as calculated from Table 1 Data given is Raw effluent SS= 210 mg/L SS removal efficiency = 60% SS concentration in primary sludge = 25 kg/m^3 Excess activated sludge = 3000 kg/day SS concentration in activated sludge = 10 kg/m^3 VM in Mixed sludge = 70% Destruction of Volatile matter in sludge digestor-65% Use logarithmic digestion formula to find the volume.	(10)	3-4	4
Q6	Answer the following questions	**(20)**		
(a)	Explain the process of anaerobic digestion and dewatering in detail with methods utilized for the same	(10)	3-4	3
(b)	Explain with short notes (a) Population Equivalent (b) Imhoff Tank (c) Wastewater reuse and recycle	(10)	2-4	3
Q7	Explain the entire process from collection of sewage to treatment of sewage to disposal at Colaba wastewater treatment plant with flowsheet and explain each unit in detail	(20)	1-4	3

Formula sheet

4-8 hrs	n=0,1/8,1/4,1/2,1	1.8-3m; 1 to 4 $m^3/d/m^2$; 0.08-0.32kg/m^3/d
50 – 150 ml/gm	ML= 90 m MW= 30 m L:W= 1.5:1 to 7.5:1 L:D= 5:1 to 25:1 D= 3 to 50 m 7.5-10%; D= 2.5 or 3.5	0.9-2.5m; 10-40$m^3/m^2/d$; 0.32-1 kg/m^3/d 0.6-1.6kg/d/m^2 6-35 m 1.6-6.4 kg/d/m^2 1 in 6 to 1 in 10 10-20 days 1.2 to 2 m 30- 40 days 4.5 to 6 m and maximum 9m 0.9 m^3

0.7-1.2 m/s	125m^3/d/m 185m^3/d/m	0.1 to 0.15per capita with dry solid loading of 80 to 120 kg/m^2/year 0.2 0.175 -0.2 m^2/c/yr area or 60-120 kg/m^2/yr
0.2-0.4/day	25-35 m^3/m^2/d; 50-60m^3/m^2/d	$Q\max = \frac{5Q_{av}}{P^{0.2}}$ $Q_{max} = \left(1+\frac{14}{4+P^{0.5}}\right)Q_{av}$
5-15 days	15-35 m^3/m^2/d; 40-50m^3/m^2/d	$Q = 10^4 A * I * \frac{Ri}{1000*3600}$
0.3-0.6kg/m^3/d	25-50%	12 to 25 min/cm

$V_S = \frac{\rho_w g (Ss-1)d^2}{18\mu}$

Or $V_S = \frac{g (Ss-1)d^2}{18\upsilon}$

Or $V_S = 418(Ss-1)d^2(T+10)/60$

$V_c = 3$ To $4.5\sqrt{(g\ d\ (Ss-1))}$

$v_c = \sqrt{\frac{8\beta g(S_s-1)d}{f}}$ $E_2 = \frac{100}{1+\frac{0.4432}{1-E_1}\sqrt{\frac{w_2}{VF}}}$

$\cos\frac{\theta}{2} = \left(1-\frac{2d}{D}\right)$

$I=a/t^n$; $I=a/(t+b)$

$Y=0.5\sqrt{B}$

$R=A/P$

$Q=A.V$

$\frac{W_s}{S_s} = \frac{W_f}{S_f} + \frac{W_w}{S_w}$

$Vs = [0.707(Ss-1)d^{1.6}\upsilon^{-0.6}]^{0.714}$

$\eta = 1-\left(1+\frac{n(v_s)}{Q/A}\right)^{-\frac{1}{n}}$ $q = \frac{Q}{A}$

$BHP = (w.Q.H)/(75.\eta_p.\eta_m)$

$\frac{Qr}{Q} = \frac{x_t}{\left(\frac{10^6}{svi}-x_t\right)}$

$\theta_C = \frac{V.x}{(Q+Q_r)x-Q_r x_r}$

$Volume = \left[Vf - \frac{2}{3}[V_f - V_d]\right]T_1 + V_d T_2$

$Volume = \frac{1}{2}[V_f + V_d]T_1 + V_d T_2$

$Q_{max} = \left(1+\frac{14}{4+P^{0.5}}\right)Q_{av}$ $F = \frac{1+R}{(1+R/10)^2}$ $Qw = \frac{VX}{\theta_c Xr}$

$\frac{1}{\theta_c} = \frac{Q}{V}(1+r-r\frac{Xr}{X})$ $U = \frac{Q*(So-S)}{V*X}$ $T = \frac{La}{20}-1$

$A=0.00622.q/V_r$; $h_L=0.0729(V^2-v^2)$ $v=Q/W*d$ $\frac{W_s}{S_s} = \frac{W_f}{S_f} + \frac{W_w}{S_w}$

$Q = C.I.A / 360$

$I = 760 / (t+10)$ $V = \frac{1}{n} * R^{\frac{2}{3}} * S^{\frac{1}{2}}$

$I = 1020 / (t+10)$

$V = 0.849 C_H R^{0.63} S^{0.54}$ $\frac{F}{M} = \frac{S}{\theta * X}$ $S_R = 100(1-0.605^{t_{37}})$

$t_0 = \frac{d^2(0.011d+0.785H)}{Q}$ $U = \left(\frac{F}{M}\right)*\left(\frac{E}{100}\right)$ $No = \frac{3.65m\sqrt{Q}}{ft^{n+1}}$

$PE = \frac{BOD\ load\ from\ industry\ \left[\frac{kg}{day}\right]}{0.054\ \left[\frac{kg}{inhab\cdot day}\right]}$ $E = \left(\frac{S_o-S}{S_o}\right)*100$

$L_t = L_o(10^{-Kt})$ x=xa+xe+xi

$E = \frac{100}{1+0.4432\sqrt{\frac{w_1}{VF}}}$

$\theta_C = \frac{V*x}{Q_w x_w + Q_e x_e}$

$h_f = flv^2/(2gD)$ $BOD5 = (DO_{1r}-DO_{5r})*dilutionfactor-(DO_{1b}-DO_{5b})$

$V_{sl} = \frac{W_s}{\gamma_w S_{sl} P_s}$

$U = \frac{Q*(So-S)}{V*X}$ $O_2\ (g/d) = \underline{Q(S_o - S)} - 1.42\ Q_w X_r$

$V = \frac{YQ(S_0-S)\theta_c}{x(1+k_d)\theta_c}$ $\theta_S = \frac{V_s}{Q}$ $\frac{f}{m} = \frac{So*Q}{V*X} = \frac{So}{\theta*X}$

$y_t = L_o(1-10^{-Kt})$

Q= 130/Vt (lpd/m^2)

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
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END SEMESTER EXAMINATION DECEMBER 2023

Program: T. Y. B. Tech. Civil Engineering Sem V
Course Code: PC-BTC503
Course Name: Soil Mechanics

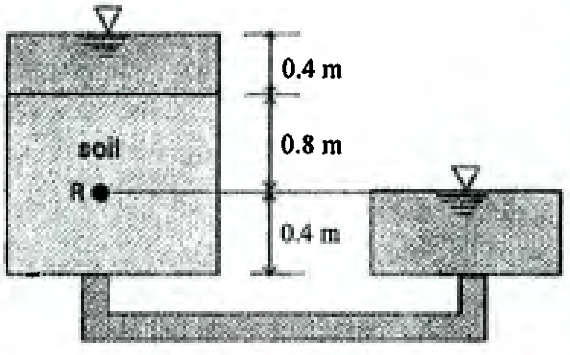
Duration: 3 Hrs.
Maximum Points: 100
Semester: V

Notes:

1. Question 1 is compulsory.
2. Solve any four out of remaining six questions.
3. Please write units everywhere. Marks will be deducted where no/incorrect units are written.
4. Make assumptions where necessary but state them very clearly. Use $\gamma_w = 10\ kN/m^3$

Q. No.		Questions	Points	CO	BL
1.	a	Discuss why a desk study and reconnaissance is important during a soil investigation.	5	4	2
	b	For a triaxial test on pure NC clay sample in the laboratory, the failure envelope was noted as 56°. If the normal stress at the site is 65 kN/m^2 determine the strength of the clay.	5	3	3
	c	Differentiate between Standard and Modified Proctor Test	5	2	2
	d	An inexperienced lab attendant conducted tests on soils and reported the following values. Determine if the results are correct and justify your answer. Bulk density = 19.3 kN/m^3, G = 2.65, void ratio = 0.86	5	1	5
2	a	A soil sample is tested in the oedometer and it is observed that 50% consolidation occurs in 1 hour. If the same soil in the field is 6 m thick, determine the time for 90% consolidation assuming single drainage in the field.	5	2,3	3
	b	Explain various reasons that cause instability in slopes	5	3	2
	c	Sieve analysis on a dry sample of 1kg mass that 980 g and 270 g pass through the 4.75 mm and 75 μ sieve, respectively. The LL and PL of the soil fraction that passes 425 m sieve are 40% and 18%, respectively. Classify the soil as per IS 1498: 1970 (R2021).	10	1	3
3	a	State the advantages and limitations of a direct shear test	5	3	2
	b	A concentrated vertical load of 3000 kN is applied on a horizontal ground surface. Points P and Q are at depths 1 m and 2 m below the ground, respectively, below the line of application of the load. Considering the ground to be a linearly elastic, isotropic, semi-infinite medium, determine the ratio of the increase in vertical stress at P to the increase in vertical stress at Q.	5	2	3

END SEMESTER EXAMINATION DECEMBER 2023

	c	Water is flowing through the sample placed in the permeameter as shown in Figure 1. If the soil permeability is 9.2×10^{-6} cm/s, determine the discharge velocity as well as the seepage velocity if porosity is 0.5. Explain how void ratio affects the coefficient of permeability of a given soil.	10	1	3
		 **Figure 1: Question 3c**			
4	a	Determine MDD, OMC and the appropriate range of moisture content for 95% of Standard Proctor compaction for the following data.	10	2	3

m (%)	6.2	8.1	9.8	11.5	12.3	13.2
γ_b (kN/m^3)	16.9	18.7	19.5	20.5	20.4	20.1

	b	Explain in detail the spring analogy given by Terzaghi for one dimensional consolidation. Illustrate with neat sketches.	10	1,2	2
5	a	A G+10 commercial structure is proposed in Andheri, Mumbai. Plan the spacing, disposition and depth of boreholes as recommended in IS 1892: 2021. Clearly state any assumptions made. Illustrate with sketches where necessary.	5	4	5
	b	A slope is inclined at an angle of 35° and its height is 15 m. The angle of friction is 15° and the cohesion is 30 kN/m^2. The unit weight of soil is 18.0 kN/m^3. If Taylor's stability number is 0.06, find the factor of safety with respect to cohesion.	5	3	3
	c	In a drained triaxial test on dry sand, the sample failed at a deviator stress of 218 kPa when confining pressure was 61 kPa. Determine the shear parameters of the soil and the angle of failure of the sample.	5	3	3
	d	Soil is always in a confined state in nature as it is bound on all sides by other soil particles. In the soil laboratory, we always try to replicate the field conditions as closely as possible. Then discuss why an unconfined compression test is performed in the lab to estimate shear parameters.	5	2,3	4

END SEMESTER EXAMINATION DECEMBER 2023

6	a	As per IS 1904: 2021, for an isolated footing on clayey soil the permissible settlement is 65 mm. Based on the following data, discuss if ground improvement is required. Compression index: 0.28, Thickness of clay is 8 m, void ratio is 0.93, increase in stress due to structure is 180 kPa and existing effective overburden pressure is 90 kPa at the centre of the clay layer.	5	2	4
	b	For the soil profile shown below draw the effective, total and pore pressure distribution. Capillary rise is 1.5 m above GWT. 0 to 2.0 m: Dry sand G = 2.66, e = 0.5 2.0 to 3.5 m: Clay G = 2.71, e = 0.75 and GWT at 3.5 m below GS 3.5 to 6.5 m: Clay G = 2.72, e = 0.95	5	1	3
	c	Determine the weight of water in kN that needs to be added to 1cubic meter of soil to attain 95% saturation if the dry unit weight is 17.5 kN/m^3, moisture content is 4% and specific gravity is 2.65.	5	1	3
	d	From the basic principles, derive the relationship between porosity and void ratio of soil	5	1	2
7	a	State the advantages and disadvantages of SPT for soil investigation	5	4	1
	b	Explain the steps to estimate stress beneath a point using Newmark's chart	5	2	1
	c	The soil profile at a site is shown in Figure 2. An isolated footing is to be placed at a depth of 5 m below ground surface. To design the footing, shear strength of the soil needs to be determined. CU tests were performed on clay samples taken at a depth of 5m. The tests were conducted with pore pressure measurement and the values of c' = 40 kPa and ϕ' = 22° were obtained. Determine the shear strength of the clay at 5m depth. Hint: major principal stress = effective overburden stress.	10	3	3

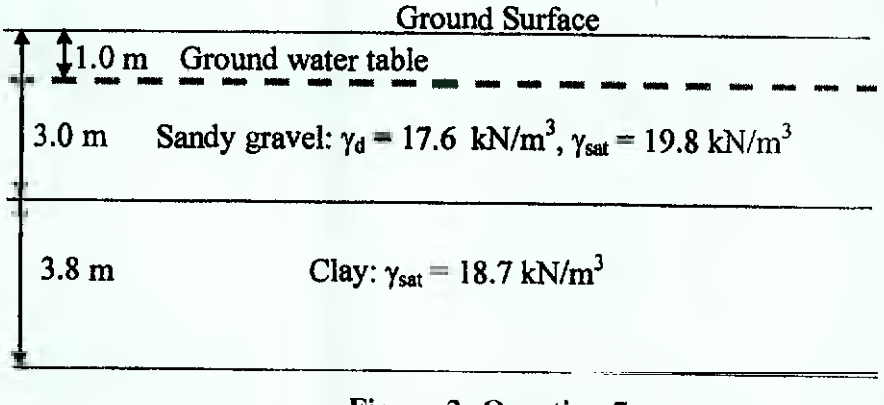


Figure 2: Question 7c