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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

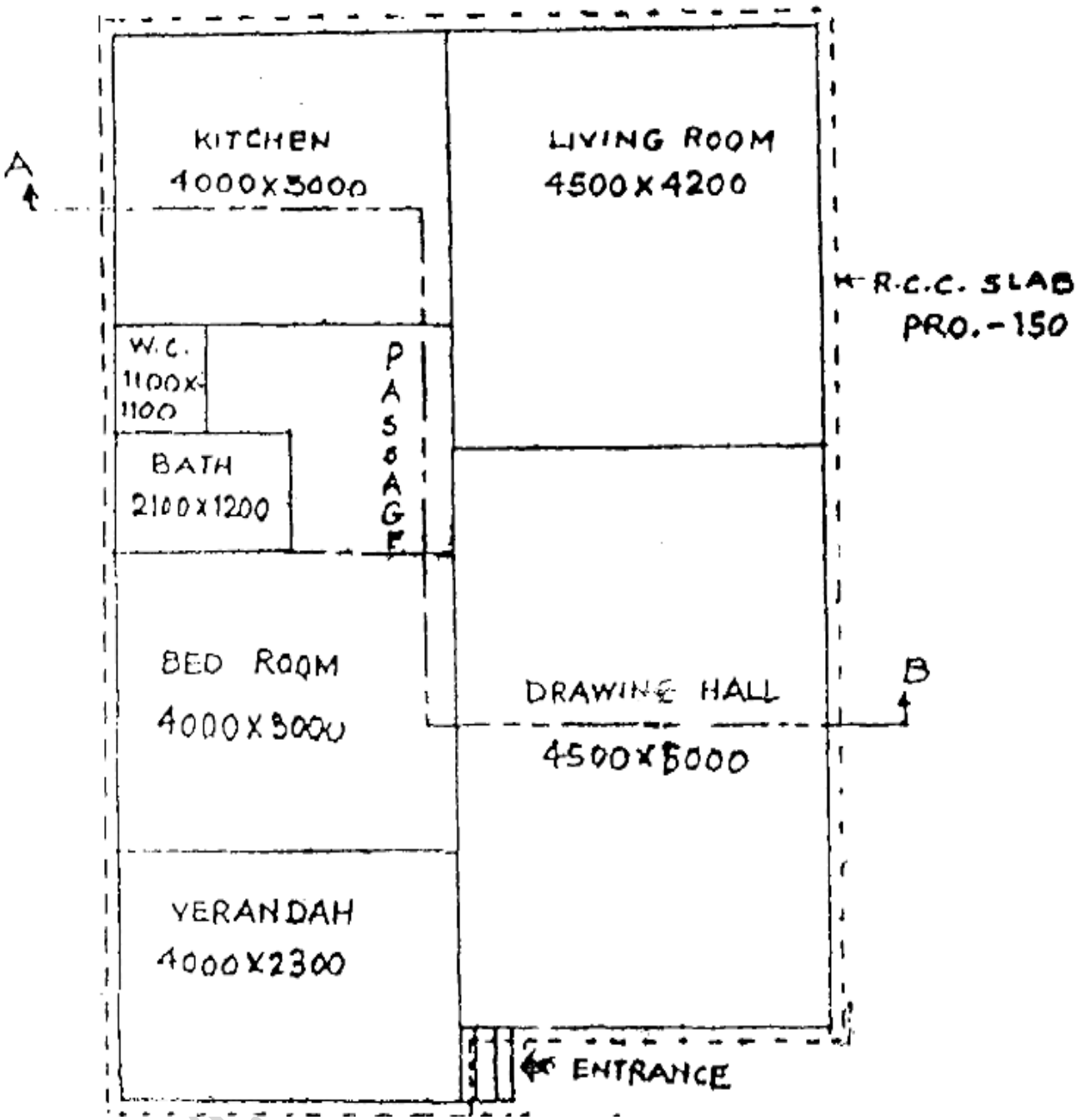
## April 2024 Semester End Main Examinations

**Programme: B.E.** **Semester: IV**
**Branch: Civil Engineering** **Duration: 4 hrs.**
**Course Code: 22CV4PCBPD** **Max Marks: 100**
**Course: Building Planning and Drawing**

**Instructions**: 1. Unit I & III are compulsory. Unit II has a choice
2. Missing data, if any, may be suitably assumed and to be mentioned.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | CO | PO | Marks |
|---|---|---|---|---|
| | **UNIT - I** | | | |
| 1 | Prepare a bubble diagram (connectivity diagrams) and develop line diagram for primary health centre, with following facilities. i) Entrance and waiting space, ii) Doctor's room – 2 nos, iii) Examination room, iv) Operation theatre, v) Medical store, vi) Office, vii) Laboratory, viii) Male ward – 10 beds, ix) Female ward – 10 beds, x) Toilet block. Also, provide the schedule of openings. | *CO3* | *PO3* | **20** |
| | **UNIT - II** | | | |
| 2 | Draw to a suitable scale a single shutter 6 panel teak wood door of size 1.2m x 2.1m | *CO2* | *PO3* | **20** |
| | **OR** | | | |
| 3 | Draw a steel roof Truss of Span 12 m. | *CO2* | *PO3* | **20** |
| | **UNIT - III** | | | |
| 4 | The line diagram of a residential building is given in Figure - 1 below. Draw to a suitable scale,<br>a) Plan at sill level, b) Front elevation, c) Section on X – X, d) Schedule of openings. e) Plot Coverage, Carpet Area and FAR if the plot size is 14 x 15 m<br>Note: All load bearing walls are of 230mm thick and internal walls are of 115mm thick, BBM built on SSM foundation. Roof is RCC and the roof height is 3.0m from floor finish. Lintel level is 2.1m above the plinth level. Assume suitable size of openings. | *CO1* | *PO3* | **60** |


A
KITCHEN
4000X3000
LIVING ROOM
4500X4200
R.C.C. SLAB
PRO.-150
W.C.
1100X
1100
BATH
2100X1200
PASSAGE
BED ROOM
4000X3000
DRAWING HALL
4500X5000
B
YERANDAH
4000X2300
ENTRANCE

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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## April 2024 Semester End Main Examinations

**Programme: B.E.** **Semester: IV**
**Branch: Civil Engineering** **Duration: 3 hrs.**
**Course Code: 22CV4PCCON** **Max Marks: 100**
**Course: CONCRETE TECHNOLOGY**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Use of IS-10262-2019 is permitted.



**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | | | *CO* | *PO* | Marks |
|---|---|---|---|---|---|---|
| | | | **UNIT - I** | | | |
| 1 | a) | What is hydration. Discuss the effect of hydration on strength development of concrete. | | ***CO*** 1 | ***PO1*** | **08** |
| | b) | Define Fineness Modulus. How it is determined for fine aggregate. | | ***CO*** 1 | ***PO1*** | **07** |
| | c) | Summarize the role of transition zone on the strength properties of concrete. | | | | **05** |
| | | **OR** | | | | |
| 2 | a) | Illustrate how the use of super plasticizer influences the properties of concrete in fresh and hardened state. | | ***CO*** 1 | ***PO1*** | **10** |
| | b) | Describe the significance of silica fume as a mineral additive in concrete. | | ***CO*** 1 | ***PO1*** | **10** |
| | | **UNIT - II** | | | | |
| 3 | a) | List out the tests to measure the workability of concrete and bring out the comparison among them. | | ***CO*** 1 | ***PO1*** | **08** |
| | b) | Define Curing. Discuss the various methods of curing. | | ***CO*** 1 | ***PO1*** | **07** |
| | c) | Explain segregation and bleeding of concrete. | | ***CO*** 1 | ***PO1*** | **05** |
| | | **UNIT - III** | | | | |
| 4 | a) | Describe the influence of w/c ratio on the properties of concrete | | ***CO*** 1 | ***PO1*** | **05** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | b) | Design a concrete mix for M25 grade of concrete using IS 10262 -2019 for the following data<br>i. Grade of concrete –M25<br>ii. Type of cement- OPC, 43 grade<br>iii. Maximum size of the aggregates – 20mm<br>iv. Minimum cement content – 320 kg/m3<br>v. Maximum W/C ratio – 0.41<br>vi. Workability – 150mm slump<br>vii. Exposure condition – Severe (RCC)<br>viii. Type of aggregates – Angular aggregates<br>ix. Maximum cement content – 450 kg/m3<br>x. Specific gravity - Cement -3.15, Coarse aggregate – 2.7, Fine aggregate – 2.6<br>xi. Chemical admixture – super plasticizer<br>xii. Water absorption – Coarse aggregate -0.5%, Fine aggregate -1%<br>xiii. Fine aggregates –Zone III | ***CO*** 2 | ***PO3,10 ,12*** | **15** |
| | | | **UNIT - IV** | | | |
| | 5 | a) | Explain the factors affecting the hardened properties of concrete. | ***CO2*** | ***PO1*** | **10** |
| | | b) | Elaborate the procedure and significance of rebound hammer test. | ***CO2*** | ***PO1*** | **10** |
| | | | **OR** | | | |
| | 6 | a) | Illustrate the mechanism of drying and autogenous shrinkage in concrete. | ***CO2*** | ***PO1*** | **10** |
| | | b) | Elaborate the methodology of carrying out the modulus of elasticity test on concrete specimen. | ***CO2*** | ***PO1*** | **10** |
| | | | **UNIT - V** | | | |
| | 7 | a) | Explain the mechanism behind the corrosion of steel in the concrete and the factors causing corrosion. | ***CO2*** | ***PO1*** | **10** |
| | | b) | Discuss chloride attack and sulphate attack on concrete and illustrate the remedial measures. | ***CO2*** | ***PO1*** | **10** |



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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## April 2024 Semester End Main Examinations

**Programme: B.E.** **Semester: IV**
**Branch: Civil Engineering** **Duration: 3 hrs.**
**Course Code: 22CV4PCENV** **Max Marks: 100**
**Course: Environmental Engineering -1**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | | UNIT - I | CO | PO | Marks |
|---|---|---|---|---|---|---|
| 1 | a) | | Describe fire demand? Calculate the fire demand of a city having a population of 250000 using various formulae. | CO1 | P01 | **05** |
| | b) | | For the following data given below, estimate the future population of a city in the year 2032 by any three suitable methods.<br>Year: 1952, 1962, 1972, 1982, 1992, 2002<br>Population: 72000, 85000, 110000, 144000, 184000, 221000<br>Comment on their relative merits and demerits of each method. | CO1 | PO1 | **08** |
| | c) | | Explain the variations in water demand with neat diagram. | CO1 | PO1 | **06** |
| | | | **UNIT - II** | | | |
| 2 | a) | | Describe an Intake structure. Illustrate with a neat sketch, a twin well river intake structure along with various components. | CO2 | PO1,2 | **08** |
| | b) | | A City has a population of 150000. Water is to be supplied at the rate of 160 lpcd. If the static lift of pump is 40 m, Calculate the BHP of the Motor. The rising main is 300 m long and its diameter is 50 cm. Assume that motor efficiency is 85 %, Pump efficiency is 60 %, f = 0.01 and the peak hour demand is 1.5 times the average demand. | CO2 | PO1,2 | **06** |
| | c) | | From a clear water reservoir 2.5 m deep and main water level of 32 m, water is pumped to an elevated reservoir at 80 m at a constant rate of 810000 L/hr. The distance is 1200 m. Take f = 0.04. Determine the economic diameter of pipe and total head. | CO2 | PO1,2 | **06** |
| | | | **OR** | | | |
| 3 | a) | | Give the maximum permissible limits as per the BIS for the following water quality parameters. Also indicate their health significance<br>i) Chlorides ii) Iron iii) MPN iv) Calcium v) Potassium | CO2 | PO1,2 | **10** |
| | b) | | Discuss the Concept of safe**,** Wholesomeness & palatability of water. | CO2 | PO1,2 | **04** |

| | | | | | |
|---|---|---|---|---|---|
| | c) | Explain various types of water borne diseases and preventive measures to be adopted. | *CO2* | *PO1,2* | **06** |
| | | **UNIT - III** | | | |
| 4 | a) | Summarize the objectives of aeration of water? Enlist various methods and with neat sketch, explain any one of them. | *CO2* | *PO1,2* | **08** |
| | b) | A Coagulation- sedimentation plant clarifies 40 million liters of water every day. The quantity of filter alum required at the plant is 18mg/l. If the raw water is having an alkalinity equivalent to 5mg/l of $CaCO_3$, compute the quantity of filter alum and the quick lime (containing 85% of CaO) required per year by the plant. Take molecular weights as Al=27, S=32, O=16, H=1, Ca=40, C=12. | *CO2* | *PO1,2* | **08** |
| | c) | Explain the purpose of coagulation and flocculation enumerating common coagulants used. | *CO2* | *PO1,2* | **04** |
| | | **OR** | | | |
| 5 | a) | With help of the neat labelled diagram, explain the working of slow sand filter. | *CO2* | *PO1,2* | **08** |
| | b) | Explain the basic mechanism involved in the filtration of water. | *CO2* | *PO1,2* | **04** |
| | c) | With diagram explain the working of Clarifloculator. | *CO2* | *PO1,2* | **08** |
| | | **UNIT - IV** | | | |
| 6 | a) | Explain various methods of disinfection along with merits and demerits | *CO3* | *PO1* | **06** |
| | b) | Explain Microfiltration and Nano filtration process of water treatment. | *CO3* | *PO1* | **06** |
| | c) | Define (i) Reverse Osmosis (ii) Pre-chlorination (iii) Post chlorination (iv) Residual Chlorine | *CO3* | *PO1* | **08** |
| | | **UNIT - V** | | | |
| 7 | a) | Illustrate with diagram grid-iron and dead end distribution network systems. | *CO3* | *PO1* | **08** |
| | b) | Explain any three types of joints in water supply with neat sketch. | *CO3* | *PO1* | **06** |
| | c) | Explain greywater recycling systems and rain water harvesting method of water conservation Techniques. | *CO3* | *PO1* | **06** |

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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## April 2024 Semester End Main Examinations

**Programme: B.E.** **Semester: IV**
**Branch: Civil Engineering** **Duration: 3 hrs.**
**Course Code: 22CV4PCGTE** **Max Marks: 100**
**Course: Geotechnical Engineering-I**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.



**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | UNIT - I | *CO* | *PO* | Marks |
|---|---|---|---|---|---|
| 1 | a) | With a phase diagram define the following:<br>i) Void ratio ii) degree of saturation<br>ii) Air content iv) Percentage air voids | CO1 | PO1 | **6** |
| | b) | In its natural condition, a soil sample has a mass of 2.298 kg and a volume of $1.18 \times 10^{-3}$ m$^3$. After being completely dried in an oven, the mass of the sample is 2.032 kg. The value of Gs for the soil is 2.7. Determine the bulk density, bulk unit weight, water content, void ratio, porosity, degree of saturation and air content. | CO1 | PO1 | **8** |
| | c) | List the different types of transported soils and the agency which transports them. Explain the characteristic feature of glacial deposits. | CO1 | PO1 | **6** |
| | | **UNIT - II** | | | |
| 2 | a) | Table 1 presents the data obtained from a percussion cup apparatus done to determine liquid limit of a soil having a natural water content of 38.0%. The plastic limit of the soil was ascertained independently and was found to be 28.4 %.<br>Table 1: Percussion cup test data (Q. 2a)<br>Number of drops: 14, 18, 23, 28, 33, 40<br>Water content (%): 45.5, 43.9, 42.5, 41.4, 40.4, 39.0<br>Using the data given in Table 1, determine the following:<br>i) Liquidity index ii) Flow index | CO1 | PO1 | **8** |
| | b) | In a sandy deposit above the water table, it was found to have a natural water content of 13.5 % and a unit weight of 18.7 kN/m$^3$. Laboratory test on a dried sample indicated minimum void ratio, $e_{min}$= 0.48 and maximum void ratio, $e_{max}$= 0.83 for | CO2 | PO2 | **6** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | the densest and loosest states respectively. Compute the suitable parameter that indicates the state of compactness of the soil in the field. Assume $G_S$ = 2.67. Also find the degree of saturation of the soil.<br>If driven piles have to be adopted in this soil, suggest whether it is advisable to go with driven piles. If yes why? If not give reasons why it is not suitable to adopt driven pile system in that soil. | | | |
| | c) | | A soil has the following physical properties obtained from a routine laboratory test. Classify the soil as per Indian Standard Soil Classification System<br>Table 2: Physical properties of soil (Q. 2c)<br>Liquid limit (%) \| Plasticity Index (%) \| Gravel (%) \| Silt (size) (%) \| Clay (size) (%)<br>32.0 \| 8.6 \| 5 \| 10 \| 1 | | | **6** |
| | | | **OR** | | | |
| 3 | a) | | 50 g of oven dried soil sample is taken for sedimentation analysis the hydrometer reading in 1000 ml suspension of soil 30 minutes after commencement of sedimentation test is 24.0. The effective depth for Rh = 24.5, found from the calibration curve is 10.5 cm. Meniscus correction is found to be + 0.5 and the composite correction is -2.5 at the test temperature of 30° C. Taking the specific gravity of particles as 2.70 and viscosity of water as 0.008 poise, calculate smallest particle size which would have settled during this interval of 30 minutes and percentage of particles finer than the size. | | | **6** |
| | b) | | Grain size distribution was done on a soil sample and the test results are as given in Table 3. The soil has a liquid limit of 72.5% and plastic limit of 35%. Plot the Grain Size Distribution plot and give the proportion of various fractions in the soil. Also **classify** the soil as per Indian Soil Classification System giving all the steps used at arriving the Group symbol of the soil.<br>Table 3 Grain size distribution data of soil sample (Q. 3b)<br>I.S sieve size (mm) \| Percent Finer<br>4.75 \| 97<br>2.36 \| 92<br>1.18 \| 88<br>0.6 \| 83<br>0.425 \| 76<br>0.300 \| 72<br>0.212 \| 70<br>0.150 \| 68<br>0.075 \| 65<br>0.058 \| 58 | | | **14** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 0.030 \| 50<br>0.010 \| 44<br>0.009 \| 40<br>0.0065 \| 38<br>0.005 \| 37<br>0.002 \| 33<br>0.0015 \| 32 | | | |
| | | | **UNIT - III** | | | |
| 4 | a) | What are the three most common clay minerals of engineering significance? With a neat sketch describe one clay mineral which if present in the red tropical soils. Also give reason for the soil to have the least swelling due to the presence of that mineral and give the common values of specific surface area, cation Exchange capacity of the clay mineral. | | CO1 | PO1 | **8** |
| | b) | A water table in a certain area is at a depth of 4 m below the ground surface. To a depth of 12 m the soil consists of very fine sand having an average void ratio of 0.7. Above the water table the sand has an average degree of saturation of 50%. Calculate the effective pressure on horizontal plane at a depth of 10 m below the ground surface. What will be the increase in effective pressure if the soil gets saturated by capillarity up to a height of 1 m above the water table?. Assume $G_s$ = 2.65. | | CO2 | PO2 | **6** |
| | c) | What is capillarity in soils? Derive an expression for the height of capillary rise in soils. In which kind of soils, it can be observed in field situations? | | CO2 | PO2 | **6** |
| | | | **UNIT - IV** | | | |
| 5 | a) | During a falling head permeability test the sample on a close investigation was found to be in two layers 70 and 30 mm thick. The routine falling head permeameter test on this sample yielded the following results:<br>Diameter of standpipe = 4 mm<br>Sample diameter = 80 mm<br>Length of the sample = 100 mm<br>Initial head = 1200 mm<br>Final head = 440 mm<br>Time for fall in head = 6.5 min<br>Determine the average permeability coefficient using the laboratory test data.<br>After the test, independent tests were made on each soil layer, and the values of coefficient of hydraulic conductivity were found to be 6.14 x $10^{-4}$ mm/s and 1.78 x $10^{-2}$ mm/s. Check the average coefficient of hydraulic conductivity through the sample in the laboratory test with the estimated value considering layer effect. Also estimate the average coefficient of hydraulic conductivity in a direction at right angles to sampling. Comment on the result. | | CO2 | PO2 | **10** |
| | b) | List and explain with neat sketches the factors that affect the compaction characteristics of soils. | | CO2 | PO2 | **10** |

<table>
<tr><td></td><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td></td><td>6</td><td>a)</td><td>Explain with neat sketches the effect of following factors on compaction characteristics of soils:<br>i) Soil type ii) Amount of compaction energy</td><td>CO2</td><td>PO2</td><td>6</td></tr>
<tr><td></td><td></td><td>b)</td><td>Table 4 presents the results of a standard compaction test conducted on a soil sample to be used for construction of an embankment for a highway project.<br>Table 4: Compaction test data (Q. 6b)
<table>
<tr><td>Water content (%)</td><td>8.5</td><td>11.2</td><td>14.3</td><td>16.4</td><td>18.1</td><td>20.2</td><td>21.6</td></tr>
<tr><td>Bulk unit weight ($kN/m^3$)</td><td>15.8</td><td>16.9</td><td>18.2</td><td>19.0</td><td>19.2</td><td>19.1</td><td>18.9</td></tr>
</table>
Plot the dry unit weight versus moisture content and obtain the maximum dry unit weight and optimum moisture content. Show100% saturation line on the plot. Take $G_s = 2.65$.</td><td>CO2</td><td>PO2</td><td>8</td></tr>
<tr><td></td><td></td><td>c)</td><td>What is seepage velocity and discharge velocity? Derive a relation between coefficient of permeability and coefficient of percolation.</td><td>CO2</td><td>PO 2</td><td>6</td></tr>
<tr><td></td><td></td><td></td><td>UNIT - V</td><td></td><td></td><td></td></tr>
<tr><td></td><td>7</td><td>a)</td><td>In a direct shear test on a specimen of clean dry sand, a normal stress of 150 $kN/m^2$ was applied and failure occurred at a shear stress of 60 $kN/m^2$.<br>Determine graphically:<br>(i) the angle of shearing resistance, (ii) the principal stresses during failure, and (iii) the directions of the principal planes with respect to the direction of the plane of shearing.</td><td>CO2</td><td>PO2</td><td>10</td></tr>
<tr><td></td><td></td><td>b)</td><td>Undrained triaxial tests are carried out on four identical specimens of silty clay and the results obtained are tabulated in Table 5. Analytically determine the value of the effective angle of shearing resistance and the cohesion intercept.<br>Table 5: Results of triaxial shear test (Q. 7b)
<table>
<tr><td>Cell Pressure ($kN/m^2$)</td><td>50</td><td>100</td><td>200</td></tr>
<tr><td>Deviator stress at failure ($kN/m^2$)</td><td>360</td><td>460</td><td>640</td></tr>
<tr><td>Pore-water pressure ($kN/m^2$)</td><td>5</td><td>10</td><td>18</td></tr>
</table></td><td>CO2</td><td>PO2</td><td>10</td></tr>
</table>



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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## April 2024 Semester End Main Examinations

**Programme: B.E.** **Semester: IV**
**Branch: Civil Engineering** **Duration: 3 hrs.**
**Course Code: 22CV4PCHYE** **Max Marks: 100**
**Course: Hydraulic Engineering**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | UNIT - I | CO | PO | Marks |
|---|---|---|---|---|---|
| 1 | a) | Differentiate between an open channel flow and a pipe flow. | CO1 | PO1 | **6** |
| | b) | Derive the expression for the most economical rectangular channel section with usual notations. | CO1 | PO1 | **6** |
| | c) | Design an earthen trapezoidal channel for water having a velocity of 0.6 m/s. Side slope of the channel is 1 horizontal to 1.5 vertical and quantity of water flowing is 3 $m^3/s$. Assume C in Chezy's formula as 65. | CO1 | PO2 | **8** |
| | | **UNIT - II** | | | |
| 2 | a) | Differentiate between total energy and specific energy of a fluid flow. Also, illustrate the typical specific energy curve. | CO1 | PO1 | **6** |
| | b) | Explain the momentum equation, and the momentum correction factor used in fluid dynamics. | CO1 | PO1 | **6** |
| | c) | Discharge of water through a rectangular channel of width 8 m is 15 $m^3/s$ when the depth of flow is 1.2 m. Calculate (i) specific energy of the flowing water (ii) critical depth and critical velocity (iii) value of minimum specific energy for the flow. | CO1 | PO1 | **8** |
| | | **UNIT - III** | | | |
| 3 | a) | Define non-uniform flow in an open channel and explain the types of non-uniform flows. List the assumptions used in the analysis of non-uniforms flows. | CO1 | PO1 | **6** |
| | b) | Derive the expression for gradually varied flow in an open channel in terms of the bed slope and the slope of the energy line. | CO1 | PO1 | **6** |
| | c) | Illustrate the non-uniform flow surface profiles in a steep slope channel. | CO1 | PO1 | **8** |
| | | **OR** | | | |
| 4 | a) | Explain different types of hydraulic jumps in a horizontal rectangular channel depending upon the value of Froude number of the incoming flow. | CO1 | PO1 | **6** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | b) | A horizontal rectangular channel 4 m wide carries a discharge of 16 $m^3/s$. Determine whether a jump occur at an initial depth of 0.5 m or not. If a jump occurs, determine the sequent depth to this initial depth. | *CO1* | *PO2* | **6** |
| | | c) | Show that the head loss in a hydraulic jump formed in a horizontal rectangular channel may be expressed as $$\Delta E = \frac{(V_1 - V_2)^3}{2g(V_1 + V_2)}$$ | *CO1* | *PO1* | **8** |
| | | | **UNIT - IV** | | | |
| | 5 | a) | Explain computational fluid dynamics with its advantages. | *CO2* | *PO1* | **6** |
| | | b) | Discuss Dirichlet and Neumann boundary conditions in the context of fluid mechanics. | *CO2* | *PO1* | **6** |
| | | c) | Discuss Navier-Stokes equation and the computational steps required to arrive at its approximate solutions. | *CO2* | *PO1* | **8** |
| | | | **UNIT - V** | | | |
| | 6 | a) | Explain dimensional analysis and list the advantage of dimensional analysis. | *CO3* | *PO1* | **6** |
| | | b) | Explain the Rayleigh's method of dimensional analysis with usual notations. | *CO3* | *PO1* | **6** |
| | | c) | Derive an expression for the drag force **F** on smooth sphere of diameter **D** moving a uniform velocity **V** in fluid density **ρ** and dynamic viscosity **μ** using the dimensional analysis. | *CO3* | *PO1* | **8** |

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# B.M.S. College of Engineering, Bengaluru-560019

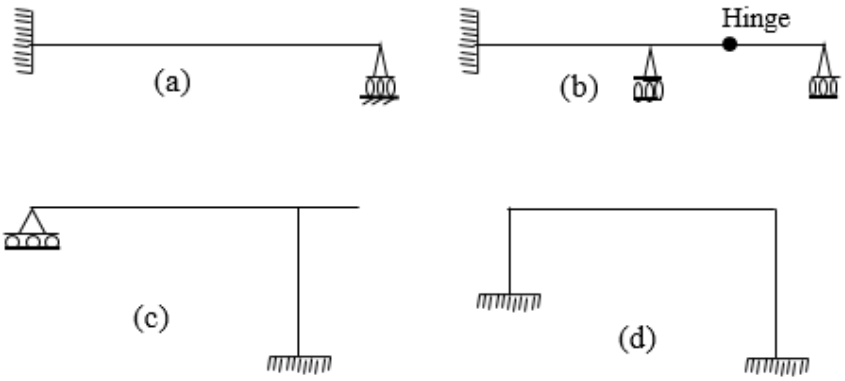
**Autonomous Institute Affiliated to VTU**

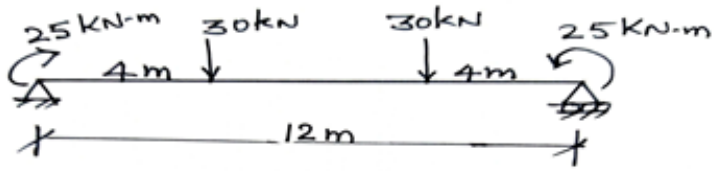
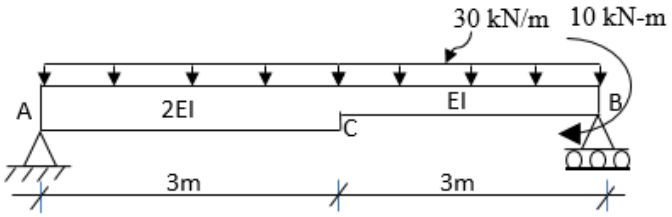
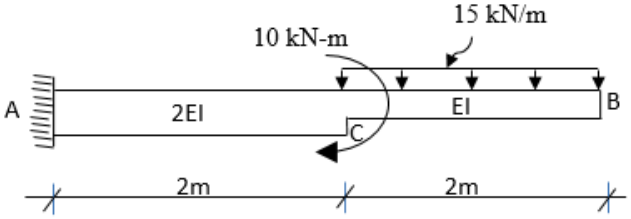
## April 2024 Semester End Main Examinations

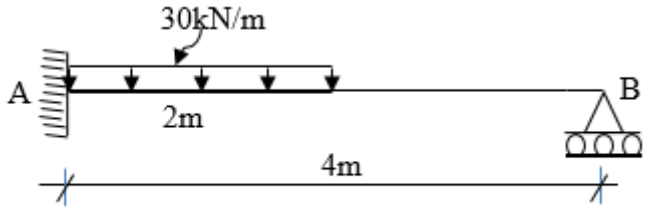
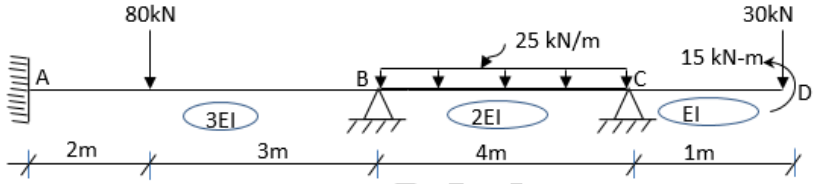
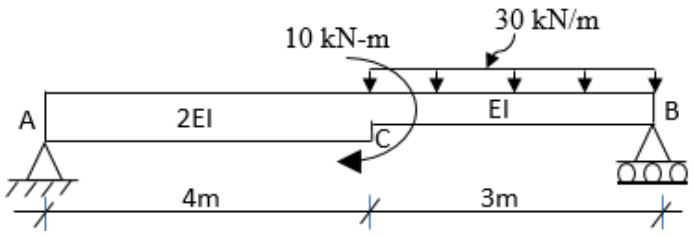
**Programme: B.E.** **Semester: IV**
**Branch: Civil Engineering** **Duration: 3 hrs.**
**Course Code: 22CV4PCSTA** **Max Marks: 100**
**Course: Structural Analysis**

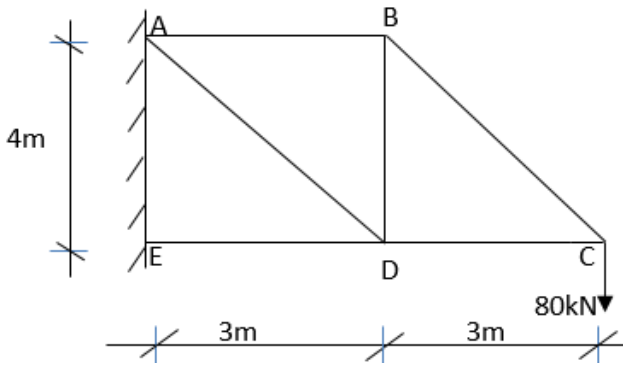
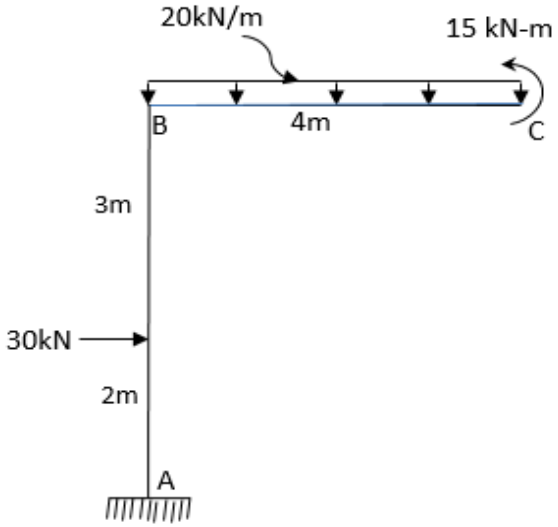
**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | | | CO | PO | Marks |
|---|---|---|---|---|---|---|
| | | | **UNIT - I** | | | |
| 1 | a) | Determine the static and kinematic indeterminacies for the structures shown in Fig. 1.   Fig. 1 | CO1 | PO1 | **08** |
| | b) | A cantilever beam of span 'L' is subjected to an uniformly varying load which varies linearly from zero at the free end to a value of w/unit length at the fixed end. Derive equation for slope and deflection at the free end using double integration method. | CO1 | PO1, 2 | **12** |
| | | **UNIT - II** | | | | |
| 2 | a) | A cantilever beam of span 3m is loaded by an UDL of intensity 6 KN/m over a distance of 2m from free end. Also a concentrated load of 15KN acts at 2m from free end. Find slope and deflection at free end using moment area method. | CO1 | PO1, 2 | **10** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | b) | A simply supported beam of span 12m is loaded by two concentrated loads of magnitude 30KN each at 4m from either supports. In addition, it is subjected to end couples of equal magnitude of 25 KN-m as shown in Fig.2. Find slope at the support and deflection at the mid span using conjugate beam method.<br>  <br><br>Fig-2 | *Co1* | *PO1, 2* | **10** |
| | | | **OR** | | | |
| | 3 | a) | Find the slope and deflection at point 'C' for the beam shown in Fig.3 using conjugate beam method. Take E=200 GPa, I=1.2x$10^8$ $mm^4$<br>  <br><br>Fig. 3 | *CO1* | *PO1, 2* | **10** |
| | | b) | Find the maximum deflection and maximum slope for the cantilever beam shown in Fig.4 using moment area method. Take E=200 GPa, I=1.2x$10^8$ $mm^4$<br>  <br><br>Fig. 4 | *CO1* | *PO1, 2* | **10** |
| | | | **UNIT - III** | | | |
| | 4 | a) | A suspension cable of span 30m and central dip 4.5m carries an uniformly distributed load of intensity 12KN/m over the entire span. Find maximum and minimum tension in the cable, length and size of cable if permissible stress is 600MPa. Also find forces acting on the supporting tower if the cable passes over smooth pulleys on top of the towers. The anchorage cable is inclined at an angle of $60^o$ with the axis of tower. | *CO1* | *PO1,2* | **12** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | b) | A three hinged parabolic arch of span 'L' and rise 'h' carries a uniformly distributed load of 'w' per unit run over the whole span. Show that the arch is not subjected to bending moment at any section. | *CO1* | *PO1,2* | **08** |
| | | | **UNIT - IV** | | | |
| | 5 | a) | Find the reaction at A and B for the propped cantilever beam shown in Fig.5 by consistent deformation method.<br>  <br><br>Fig.5 | *CO1* | *PO1,2* | **06** |
| | | b) | Using the theorem of three moments analyze the continuous beam shown in Fig. 6. Take E=200 KN/mm$^2$, I=1.8 x 10$^8$ mm$^4$. Draw BMD and elastic curve. Assume support B sinks by 5mm<br>  <br><br>Fig. 6 | *CO1* | *PO1,2* | **14** |
| | | | **UNIT - V** | | | |
| | 6 | a) | A simply supported beam is loaded as shown in Fig. 7. Determine deflection at 'C' using Castigliano's theorem. Take EI= 12000 KN-m$^2$.<br>  <br><br>Fig. 7 | *CO2* | *PO1,2* | **10** |
| | | b) | Determine the vertical deflection at the point C in the pin jointed truss shown in Fig. 8 using unit load method. The cross-sectional area of all members is 1000 mm$^2$. Take E = 200 kN/mm$^2$. | *CO2* | *PO1,2* | **10** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | |  <br>Fig. 8 | | | |
| | | | **OR** | | | |
| | 7 | a) | Derive an equation for strain energy stored in a member due to bending. | *CO2* | *PO1* | **04** |
| | | b) | Explain strain Energy and complimentary strain energy with the examples. | *CO2* | *PO1* | **04** |
| | | c) | Determine the horizontal and vertical displacement at the point C of the rigid frame shown in Fig. 9 using Castigliano's theorem method. Take EI= 12000 KN-m$^2$.<br>  <br>Fig. 9 | *CO2* | *PO1,2* | **12** |

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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## April 2024 Semester End Main Examinations

**Programme: B.E.** **Semester: III / IV**
**Branch: Common to all Branches** **Duration: 01hr 30min.**
**Course Code: 22CV3HSEVS / 22CV4HSEVS** **Max Marks: 50**
**Course: Environmental Studies**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | PART A | *CO* | *PO* | Marks |
|---|---|---|---|---|---|
| | 1 | What factors are considered as the causes of eutrophication?<br>a) Increment in plant nutrients b) Using fertilizers excessively<br>c) Both (A) and (B) d) None of the above | CO1 | PO1 | **1** |
| | 2 | Which layer of the atmosphere contains the ozone layer necessary for UV(ultraviolet) light absorption?<br>a) Stratosphere b) Troposphere<br>c) Mesosphere d) None of these | CO2 | PO1 | **1** |
| | 3 | What type of human activity can lower the atmospheric oxygen content?<br>a) Deforestation b)Hunting<br>c) Mining d) None of the above | CO2 | PO1 | **1** |
| | 4 | Name the gas that is vital in maintaining atmospheric temperature<br>a) Oxygen b) Carbon Dioxide<br>c) Nitrogen d) None of the above | CO3 | PO1 | **1** |
| | 5 | All species on earth with each other along with their respective environmentscollectively constitute<br>a) Biosphere b) Atmosphere<br>c) Hydrosphere d) Lithosphere | CO2 | PO1 | **1** |
| | 6 | Minamata disease is related to which of the following?<br>a) Hg pollution b) Cd pollution<br>c) $SO_2$ pollution d) None of these | CO2 | PO1 | **1** |
| | 7 | Which one of the following is an example of nonrenewable resource?<br>a) Water b) Vegetation<br>c) Wind d) Coal and minerals | CO2 | PO1 | **1** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 8 | Ozone layer is found in<br>a) Thermosphere b) Stratosphere<br>c) Troposphere d) Mesosphere | CO1 | PO1 | **1** |
| | | 9 | A human body consists of_____number of bones<br>a) 205 b)210<br>c) 200 d) 206 | CO2 | PO1 | **1** |
| | | 10 | A herbivore is also known as a<br>a) Producer b) First order consumer<br>c) Second order consumer d)Third order consumer | CO3 | PO1 | **1** |
| | | 11 | The second trophic level in a lake is<br>a) Phytoplankton b) Zooplanktons<br>c) Fishes d) Benthos | CO1 | PO1 | **1** |
| | | 12 | A poisonous gas given out of a vehicle exhaust is<br>a)Methane b) Ethane<br>c) Carbon di oxide d) Carbon Monoxide | CO2 | PO1 | **1** |
| | | 13 | A pH of rainwater is<br>a) 5-6 b) 6 – 7<br>c) 7-8 d) 8 - 9 | CO1 | PO1 | **1** |
| | | 14 | Yellowing of Taj Mahal is an effect of<br>a)Acid Rain b) Global Warming<br>c) Ozone depletion d) All the above | CO2 | PO1 | **1** |
| | | 15 | Possible health effects of noise pollution include<br>a)Hearing loss b) Hypertension<br>c) Cardiovascular effects d) All the above | CO3 | PO1 | **1** |
| | | 16 | How much percentage of nitrogen is in Earth's Atmosphere?<br>a) 25%. b) 12%.<br>c) 92%. d) 78%. | CO3 | PO1 | **1** |
| | | 17 | With respect to environment science, full form of SPM is<br>a) Suspended Partial Matter. b) Suspended Particulate Matter.<br>c) Suspended Pollutant Matter d) None of these. | CO1 | PO1 | **1** |
| | | 18 | In an ecosystem, bacteria are the<br>a) Producers. b) Primary consumers<br>c) Secondary consumers. d) Decomposers | CO2 | PO1 | **1** |
| | | 19 | Syringes are examples of<br>a) Industrial wastes. b) Biomedical wastes.<br>c) Domestic wastes. d) Radioactive wastes. | CO2 | PO1 | **1** |
| | | 20 | World environment day is celebrated every year on<br>a) Aug 12 b) June 5<br>c) September 8 d) July 10 | CO3 | PO1 | **1** |
| | | | | | | |
| | | | **PART B** (Answer any **THREE** full questions) | | | |
| | 1 | a | Explain various parts of Lithosphere | CO1 | PO1 | **6** |
| | | b | Define Ecology and Ecosystem | CO1 | PO1 | **4** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 2 | a | Briefly explain Environmental Impact Assessment (EIA) and Sustainable Development | CO2 | PO2 | **5** |
| | | b | Explain the Effects of Human activities on Agriculture and Industries | CO2 | PO2 | **5** |
| | | | | | | |
| | 3 | a | Explain the causes & consequences of deforestation | CO3 | PO1 | **5** |
| | | b | Distinguish between Conventional and Non-conventional energy resources | CO3 | PO1 | **5** |
| | | | | | | |
| | 4 | a | Discuss the effects & control of noise pollution. | CO3 | PO1 | **5** |
| | | b | Discuss the effects & control of Air pollution. | CO3 | PO1 | **5** |

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