C020511(020)

B. Tech. (Fifth Semester) Examination, Nov.-Dec. 2021
AICTE
(New Scheme)

(Civil Engg. Branch)

STRUCTURAL ENGINEERING DESIGN-I

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all question. Part (a) from each question is compulsory and carries 4 marks. Attempt any two questions from Part (b), (c) and (d) parts of each unit and carris 8 marks each question. IS: 456-2000 is permitted. Assume suitable data whenever necessary.*

Unit-I

1. (a) What are the properties of concrete? Describe any three properties in details.   4

(b) The coss-section of singly reinforced beam is 230 × 450 mm to the center of tension steel which consists of 3 bars of 16 mm diameter. Determine the moment of resistance of the beam. Use WSM. 8

(c) Determine the moment of resistance of the beam, using working stress method, whose section is 300 × 900 mm and reinforced with 2 bar of 16 mm diameter at top and 4 bars of 20 mm diameter at bottom. Take effective cover as 50 mm for tension and compression steels. 8

(d) A beam 300×600 mm effective dimensions is provided with tension and compression reinforcement of 1000 mm² each. The effective cover to both these reinforement is 25 mm. Find out the moment of resistance of this section, using working stress method. 8

Unit-II

2. (a) Difference beween WSM and LSM in details. 4

(b) A RCC beam, doubly reinforcement is 300 mm wide & 500 mm deep. Find area of tension and compressive reinforement if it is subjected to (unfactored) total bending moment of 250 kN-m

take cover to center of top and bottom reinforcement as 40 mm us LSM method. 8

(c) A doubly reinforcement concrete beam has 350 × 750 mm. Area of steel in tension = 4 nos., 22 mm diameter and area of steel in compression = 4 nos., 16 mm diameter of Fe-415 steel. Design the beam if it subjected to a super imposed moment of 400 KN-m (unfactored). Take the cover of top and bottom reinforcement as 50 mm. 8

(d) Find the moment of resistance of a singly reinforced concrete beam of 200 mm width and 400 mm effective depth. If it is reinforcement with (i) 4 bars with 16 mm diameter (ii) 3 bars with 16 mm diameter. 8

Unit-III

3. (a) Explain important IS 456:2000 recommendations for effective span of slab and control of deflection. 4

(b) Design one of the flights of stair of a school building spanning between landing beams to suit the following data : 8

Type of staircase = waist slab type

Number of steps in flight = 12

Live load	=	15 kN/m
Tread	=	300 mm
Riser	=	160 mm
Width of landing beams	=	400 mm

Materials M-20 concrete and Fe-415 HYSB Bars.

(c) Design a simply supported concrete slab for a room having inside dimension of 3 m × 7 m, the thickness of supporting wall is 300 mm. The slab carries 75 mm thick flooring of unit weight 20 kN/m². The live load on the slab is 2 kN/m². Check for shear development length and anchorage at ends is not required.   8

(d) Find moment of resistance of a R.C.C. T-Beam with the following data. Width of flange 750 mm, depth of flange 125 mm, width of web 250 mm, effective depth from top of flange up to centre of reinforcement 500 mm. Area of tension reinforcement 1600 mm².   8

Unit-IV

4. (a) What is column? How will you differentiate short and long column?   4

(b) What do you mean by effective length of column? Explain in details.   8

(c) Design a short axially loaded column 500 mm × 500 mm for a load of 2000 kN.   8

(d) A diameter of a helically reinforced short column is 300 mm and it is reinforced with 8 nos of 20 mm diameter bars. The cover up to outside of longitudinal reinforcement is 40 mm. Helical reinforcement consists of 8 mm diameter steel at a pitch of 30 mm. Find the safe axial load on the column.   8

Unit-V

5. (a) What do you mean by footing? Explain types of footings.   4

(b) Design an isolated footing of uniform thickness of R.C. Column bearing a vertical load of 600 kN and having a base size 500×500 mm, the safe bearing capacity of soil may be taken as 120 kN/m². Use M-20 and Fe-415.   8

(c) Discuss the design steps for column footing.   8

(d) A reinforced column 400 mm × 400 mm support

on axial service load of 1,000 kN. The safe bearing capacity of soil is 200 kN/m². M-20 and Fe-415 used. Design the suitable footing and sketch the reinforcement placement.   8

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B. Tech. (Fifth Semester) Examination, Nov.-Dec. 2021

AICTE
(New Scheme)

(Civil Engg. Branch)

HYDROLOGY and WATER RESOURCES ENGINEERING

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

*Note : Attempt all questions. From all the units question (a) is compulsory and from remaining parts attempt any **two** questions.*

Unit-I

1. (a) Define the term hydrologic cycle.   4

   (b) What do you understand by water budget equation?   8

(c) Describe the principle of working of a float-type recording rain gauge with a neat sketch. 8

(d) Describe the different methods of determining the mean precipitation over a given area. 8

Unit-II

2. (a) What is evaporation process? 4

(b) Explain the factors affecting infiltration capacity. 8

(c) A 7 hour storm produced the following rainfall intensities (in mm/hr) at half an hour intervals over a basin of area 1830 km², 4, 9, 20, 18, 13, 11, 12, 2, 8, 16, 17, 13, 6 and 1. If the corresponding observed runoff is m³. Determine the phi-index for a basin. 8

(d) Explain various methods of base flow separation from hydrograph. 8

Unit-III

3. (a) Define consumptive use. 4

(b) Derive a relationship between duty and delta, and explain the methods of improving duty of irrigation water. 8

(c) Write about drip irrigation in detail with neat sketch. 8

(d) The following data pertains to the healthy growth of a crop. 8

   (i) Field capacity of soil = 30%

   (ii) Permanent wilting percentage = 11%

   (iii) Density of soil = 1300 kg/m³

   (iv) Effective depth of root zone = 700 mm

   (v) Daily consumptive use of water for the given crop = 12 mm

For healthy growth moisture content must not fall below 25% of the water holding capacity between the field capacity and the permanent wilting point. Determine the watering. 8

Unit-IV

4. (a) Distinguish between a contour canal and ridge canal. 4

(b) Design an irrigation channel in alluvial soil for the following data :

Full supply discharge (Q) = 15 cumecs, Lacey's silt factor = 1, silt slope of channel. 8

(c) Describe various methods adopted as anti-water logging measures. 8

(d) Explain the different types of canal lining. 8

Unit-V

5. (a) What is reservoir sedimentation? 4

(b) Describe the types of reservoir based on the purpose served. 8

(c) Explain the following : 8

   (i) Safe yield and Design yield

   (ii) Storage zone of reservoir

(d) Describe the graphical method of flood routing. 8

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B. Tech. (Fifth Semester) Examination, Nov.-Dec. 2021

AICTE   (Old Scheme)

(Civil Branch)

GEOTECHNICAL ENGINEERING

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all questions. From all the units question a is compulsory and from remaining parts attempt any two question.*

Unit-I

1. (a) Explain the following :   4

    (i) Water content

    (ii) Degree of saturation

    (iii) Void ratio

(iv) Specific gravity

(b) A sampler with volume of 60 cm³ is filled with saturated soil sample. The specific gravity of solid is 2·65. When the oven dry soil is poured into a graduated cylinder filled with water, it displaces 40 cm³ of water. What is the natural moisture content and dry unit weight of soil.   8

(c) A soil sample of volume 320 cm³ weights 600 gm. On oven drying, the weight of sample reduced to 90% and volume reduced by 12%, calculate :   8

(i) Shrinkage Limit

(ii) Specific Gravity

(iii) Shrinkage Ratio

(d) Explain the following method of classification of soil :   8

(i) Textural Classification

(ii) AASHTO Classification

Unit-II

2. (a) Define Zero Air Void Line.   4

(b) Explain the factor affecting compaction.   8

(c) For a subsoil condition shown in figure draw the total, natural and effective stress diagram at 1 m, 3 m, and 6 m below the ground level. Assume $\gamma_w = 10$ kN/m³.   8
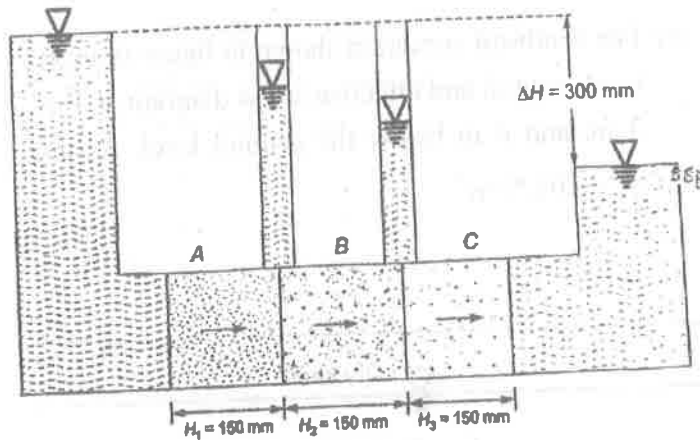

GL

Dry sand

sand, $e = 0.4$, G = 2.65

clay, $\gamma_{sat} = 20$ kN/m³
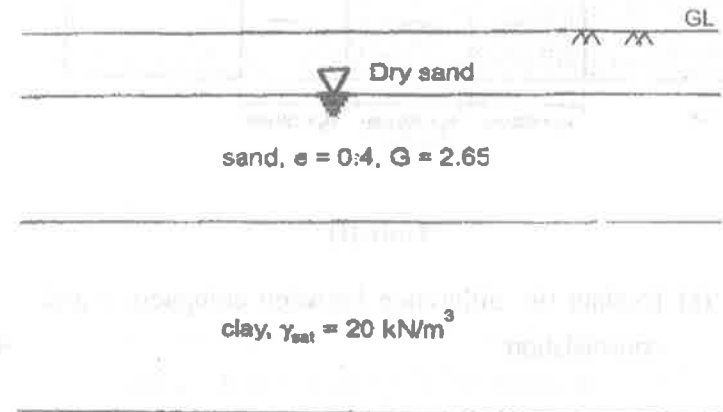
(d) The soil layers below have a cross-sectional area of 100 mm × 100 mm each. The permeability of each soil is : $k = 10^{-2}$ cm/sec; $k_a = 3 \times 10^{-3}$ cm/sec; $k_c = 4.9 \times 10^4$ cm/s. Find threrate of water supply in cm³/hr.   8

$\Delta H = 300$ mm

A   B   C

$H_1 = 150$ mm $H_2 = 150$ mm $H_3 = 150$ mm

Unit-III

3. (a) Explain the difference between compaction and consolidation.   4

    (b) In a consolidation test, the void ratio of the specimen which was 1.052 under the effective pressure of 207 kN/m², changed to 0.932 when the pressure was increased to 430 kN/m². Calculate :   8

    (i) Coefficient of Compressibility

    (ii) Compression Index

    (iii) The Coefficient of Volume Compressibility

(c) A clay layer, 8 m thick, is subjected to a pressure of 70 kN/m². If the layer a double drainage and undergoes 50% consolidation $(T_v = 0 \cdot 196)$ in one year, determine the coefficient of consolidation. If the coefficient of permeability is 0·040 m/year, determine the settlement in one year. Use $\gamma_w = 9.81$ kN/m³.   8

(d) Explain the direct shear test with neat sketch.   8

Unit-IV

4. (a) Explain the types of slopes.   4

    (b) An infinitely long slope having in inclination of 26° in an area is underlain by firm choesive soil (G = 2·72 and e = 0·65). There is a thin weak, layer of soil 6 m below and parallel to the slope surface (c = 25 kN/m², $\phi = 16°$). Compute the factor of safety when the slope is dry. If ground water flow could occur parallel to the slope on the ground surface, what factor of safety would result?   8

    (c) Explain the assumptions of stability of slopes and also describe the types of failure with neat sketch.   8

(d) Explain Swedish circle method with neat sketch and also calculate the factor of safety with respect to the shear strength analysis by the method of slices for 1:1 slope on the critical slip gave the following results :   8

Sum of tangential forces	=	150 kN
Sum of normal forces	=	320 kN
Sum of neutral forces	=	50 kN
Length of failure surface	=	18 m
Effective angle of searing resistance	=	15°
Effective cohesion	=	20 kN/m²

Unit-V

5. (a) Define soil exploration.   4

(b) Explain the boring method of exploration with neat sketch.   8

(c) Explain the design of sampler with neat sketch.   8

(d) Explain the SPT Test for subsurface investigation.   8

C020514(020)

B. Tech. (Fifth Semester) Examination, Nov.-Dec. 2021

(Civil Engg. Branch)

TRANSPORTATION ENGINEERING

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

*Note : Attempt all the questions. From all the units question (a) is compulsory and from remaining parts attempt any **two** questions.*

1. (a) Explain the recommendations of Jaykar Committee. 4

   (b) Define camber. And in a district road where the rainfall is heavy, major district road of WBM

pavement 3·8 m wide and a state highway of bitu-minous concrete pavement, 7·0 m wide are to be constructed. What should be the height of crown with respect to the edges in these two cases?   8

(c) On a two way traffic road, the speed of overtaking vehicles are 100 kmph and 50 kmph. If the average acceleration is 0·92 m/s². Determine the overtaking sight distance. Draw neat-sketch of the overtaking zone and show the positions of the sign posts.   8

(d) Explain the different types of gradients.   8

2. (a) Draw the neat sketch of different types of traffic maneuvers.   4

(b) Explain the vehicular characteristics. And also determine the average skid resistance, when a vehicle travelling at the speed of 80 kmph, stopped within 2·5 seconds after the application of the breaks.   8

(c) Explain the different types of traffic sign with neat sketch of some signs.   8

(d) Define traffic rotary and also explain the various component with neat sketch.   8

3. (a) Enlist the various soil classification system.   4

(b) Design the pavement section by triaxial test method using the following data :

Wheel load	=	4100 kg
Radius of contact area	=	15 cm
Traffic coefficient	=	1·5
Rainfall coefficient	=	0·9
Design deflection	=	0·25 cm
E value of subgrade soil	=	100 kg/cm²
E value of base course material	=	400 kg/cm²
E value of 7·5 cm thick bituminous concrete surface course	=	1000 kg/cm² 8

(c) Using the data given below, calculate the wheel load stresses at (a) interior, (b) edge and (c) corner regions of a cement concrete pavement using Westergaard's stress equations. Also determine the probable location where the crack is likely to develop due to corner loading.

Wheel load, $P = 5100$ kg

Modulus of elasticity of cement concrete, $E = 3 \cdot 0 \times 10^5 \ kg/cm^2$

Pavement thickness, $h = 18 \ cm$

Poisson's ratio of concrete, $\mu = 0 \cdot 15$

Modulus of subgrade reaction, $K = 6 \cdot 0 \ kg/cm^2$

Radius of contact area, $a = 15 \ cm$ 8

(d) Explain the different types of joints with neat sketch.   8

4. (a) Explain different types of gauges.   4

(b) Explain the various types of rail failures with neat sketch.   8

(c) Define sleeper density. And using a sleeper density of M + 5, find out the number of sleepers required for constructing a railway track 640 meters long. (B. G. track).   8

(d) Explain the different types of ballast.   8

5. (a) Enlist the different types of causes of derailments over the turnout.   4

(b) On a B. G. 3° curve the "equilibrium cant" is provided for a speed of 70 kmph :

(i) Calculate the value of equilibrium cant

(ii) Allowing a maximum cant deficiency. What would be the maximum permissbile speed on the track?   8

(c) Explain the different types of track junction with neat sketch.   8

(d) Explain the operation classification of railway station with neat sketch.   8

C020531(020)

B. Tech. (Fifth Semester) Examination Nov.-Dec. 2021

A)CTE   (New Scheme)

(Civil Engg. Branch)

STRUCTURAL ANALYSIS-II

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

*Note : Attempt all questions. Part (a) from each question is compulsory. Attempt any **one** parts from parts (b), (c) of each question.*

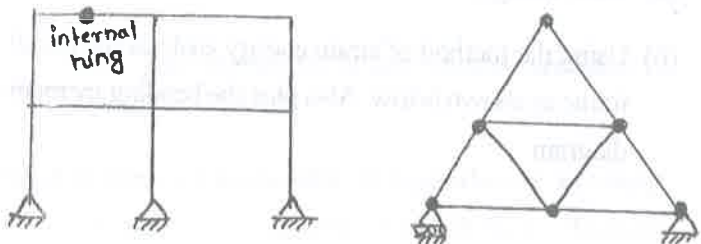1. (a) Calculate the static indeterminacies of below figures.   4

internal
ring

Fig. 1(a)

(b) For a two span beam shown below, find the support moment and reactions and plot the bending moment and shear force diagram by three moment equation. 16
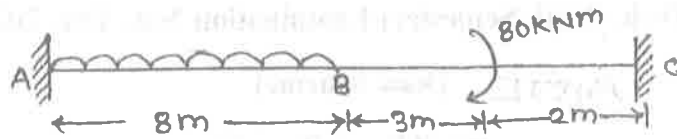
Fig. 1(b)

(c) A cantilever of uniform flexural stiffness is propped at the free end as shown below. Calculate the reaction on the propped when a load 30 kN is applied. Using the method of consistant deformation. 16
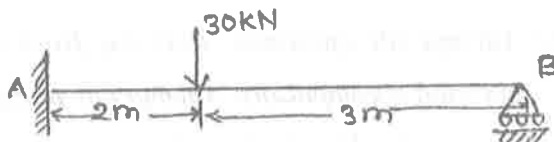
Fig. 1(c)

2. (a) State castigliano's theorem of minimum strain energy. 4

(b) Using the method of strain energy analysis the portal frame as shown below. Also plot the bending moment diagram. 16
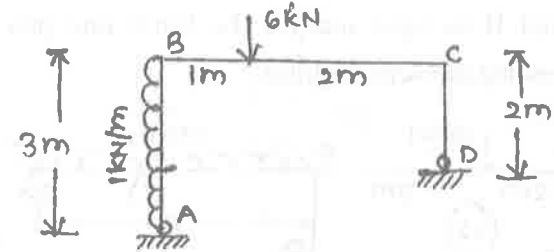
Fig. 2(b)

(c) A braced cantilever truss is loaded as shown in figure. All the members are of the same material and have the same cross sectional area. Find the axial forces in the in the member AD? 16
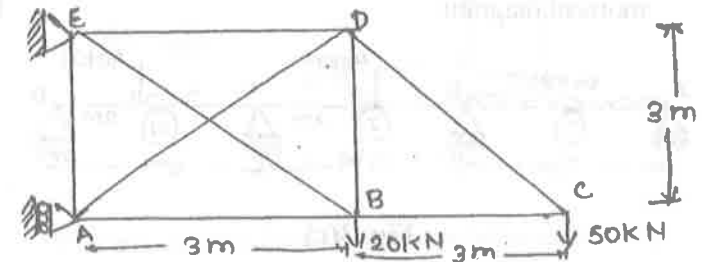
Fig. 2(c)

3. (a) Define absolute stiffness and relative stiffness of member. 4

(b) A continuous beam ABC is supported on an elastic column BD, and is loaded shown in figure. Treating

joint B as rigid, analyse the frame and plot the bending moment diagram. 16
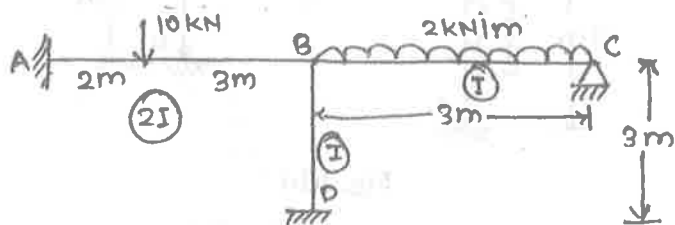

Fig. 3(b)

(c) Analyse the continuous beam ABCD shown in figure by moment distribution method. Draw bending moment diagram. 16
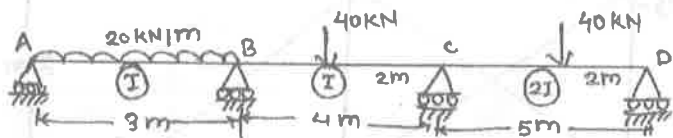

Fig. 3(c)

4. (a) What is the basic concept behind the column analogy method? Write the application of column analogy method. 4

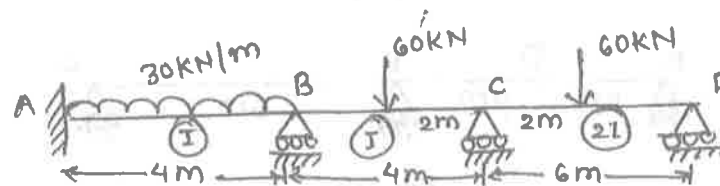(b) Analyse continuous beam and draw bending moment diagram using slope deflection method. 16

Fig. 4(b)

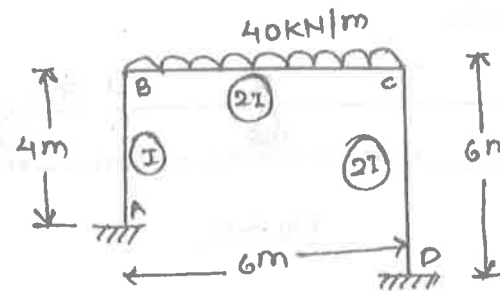(c) Analyse the frame shown in figure using slope deflection method. 16

Fig. 4(c)

5. (a) What are influence line? Differentiate between bending. moment diagram and influence line diagram. 4

(b) Using Mullers-Breslau principle, draw influence line diagram for the bending moment at the D middle point of span AD of a continuous beam shown below. Compute the ordinate at 1 m interval. 16
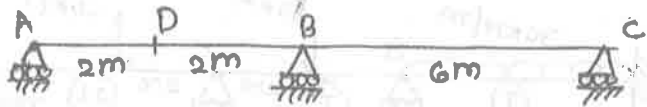
Fig. 5(b)

(c) Determine the influence line for shear force at D, the middle point of span BC of a continuous beam shown in figure. Compute the ILD ordinate at 1·5 m intervals.   16
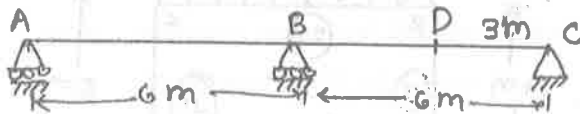

Fig. 5(c)

C020533(020)

B. Tech. (Fifth Semester) Examination,
Nov.-Dec. 2021

AICTE (New Scheme)

(Civil Engg. Branch)

GROUNDWATER ENGINEERING

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) is compulsory
& solve any *two* from (b), (c) & (d) of each
questions.

Unit-I

1. (a) Define hydro metrology and scope of hydrology.   4

   (b) Decribe briefly distribution of water on earth.   8

(c) Describe hydrologic cycle with a neat sketch. 8

(d) Describe hydrology and explain component of hydro-logy. 8

Unit-II

2. (a) What is well construction? 4

(b) Explain management of ground water resources. 8

(c) Describe in brief the occurrence ground water with neat sketch. 8

(d) Write short notes on : 8

    (i) Well hydraulics

    (ii) Geo-physical exploration

Unit-III

3. (a) What is Aquifer? 4

(b) Explain steady and unsteady radial flows in aquifiers. 8

(c) Write short notes on : 8

    (i) Specific capacity

    (ii) Partially penetrating wells

(d) Explain multiple well systems and also explain charac-teristics of well losses. 8

Unit-IV

4. (a) Explain surface and sub-surface investigation. 4

(b) Explain geologic method of surface investigation. 8

(c) Write short notes on : 8

    (i) Seismic refraction

    (ii) Electrical resistivity

(d) Describe remote sensing and geophysical exploration. 8

Unit-V

5. (a) What is Water Wells? 4

(b) Describe protection and rehabilitation of wells. And also explain groundwater quality. 8

(CC) (d) Write short notes on : 8

    (i) Basin management

    (ii) Groundwater management

(d) What is modeling and explain artificial recharge? 8