

No. of Printed Pages : 05

Roll No.

C71

B. Tech. EXAMINATION, 2020

(Third Semester)

(B Scheme) (Re-appear Only)

(CE)

CE201B

STRENGTH OF MATERIALS

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

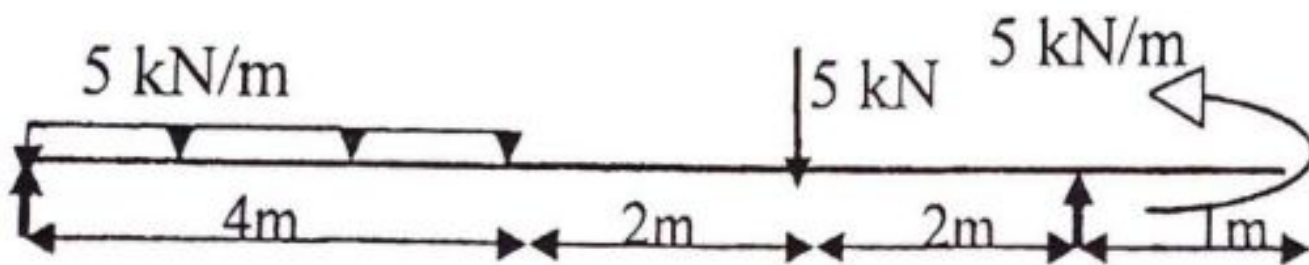
Note : Attempt *Four* questions in all. All questions carry equal marks. Any data if missing can be suitably assumed. Use of scientific calculator is allowed.

(3-18/9) M-C71

P.T.O.

1. (a) Explain the following terms with the help of figure :
- (i) Bearing stress
 - (ii) Shear stress
 - (iii) Poisson's Effect.
- (b) Show that when a material is subjected to the shearing stresses and the direct stresses in one direction, the major principal stress are of opposite nature. 5
- (c) Two vertical rods one of steel and the other of bronze are rigidly fastened at upper ends at a horizontal distance of 760 mm apart. Each rod is 3 m long and 25 mm in diameter. A horizontal cross piece connects the lower ends of the two bars. Where should a load of 5 kN be placed on the cross piece so that it remains horizontal after being loaded. Young's modulus are $E_s = 2.1 \times 10^5$ MPa and $E_{br} = 1.12 \times 10^5$ MPa.

2. (a) A beam has equal overhanging beyond both the supports and carries uniformly distributed load throughout the span. Show that sagging moment, hogging moment and point of inflexion with the help of figure.
- (b) Draw shear force and bending moment diagrams for the following loading. All calculations must appear clearly.



3. If the beam cross-section is rectangular having a width of 75 mm , determine the required depth such that maximum bending stress induced in the beam does not exceed 40 MPa .
4. An I section beam with 400 mm overall depth and 200 mm flange and uniform width of 25 mm throughout. The beam is simply supported over a span of 5 m and carries

uniformly distributed load 25 kN/m throughout. Draw the shear stress distribution across the section for the maximum shear force in the beam.

5. (a) A solid circular shaft having diameter ' d ' is fixed at one end and a twisting moment ' T ' is applied at the other end. Write the expression of elastic torsional formula for the shaft and explain the following terms with the help of figure :
- (i) Angle of twist
 - (ii) Shearing strain.
- (b) A bar 50 mm diameter and 5 metre long is rigidly fixed at its ends. A torque of 20 kNm is applied at a section 1 m from support. Calculate the fixing couples at the supports and maximum torsional stress induced in the shaft. Also, calculate the angle of twist at the section where the torque was applied if modulus of rigidity is 0.80×10^5 MPa.

6. A strut is made of T section, the flange being $100 \text{ mm} \times 10 \text{ mm}$ and web $70 \text{ mm} \times 10 \text{ mm}$. The strut is 3 m long and both ends are hinged. If Young's modulus is 200 GPa, calculate the buckling load for the T Section.
7. (a) Explain the theorems for slope and deflection by moment area method.
- (b) A simply supported beam is 3 metre long and is subjected to a point load at mid span. If the maximum permissible slope is 1° , determine the maximum deflection for the beam.
8. Explain the following theories with their advantages and limitations :
- (a) Rankine's theorem of failure
- (b) Maximum shear stress theory
- (c) Distortion energy theory.

No. of Printed Pages : 04

Roll No.14.....

C75

B. Tech. EXAMINATION, 2020

(Third Semester)

(B Scheme) (Re-appear Only)

(CE)

CE209B

BUILDING MATERIALS

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

(3-18/14)M-C75

P.T.O.

1. (a) Explain the following properties of the materials :
 - (i) Hardness and Creep
 - (ii) Fatigue and Fracture
 - (iii) Wear properties.
- (b) Explain the different types of corruptions and the how a material can be protected against corrosion ?
2. (a) What are the properties of first class bricks ? What is efflorescence in bricks ? What are its causes and remedies ?
- (b) Compare the benefits of the bricks over the stone as a building material.
3. (a) What are the ingredients of Portland cement ? State the function and limits of each of them.
- (b) What tests would you specify to ensure if the cement supplied at the site is of good quality ?
- (c) Explain the composition of cement clinker.

4. (a) What are the characteristics of lime ?
(b) State the harmful effects of silica, sulphates and alkalis in lime.
(c) How is lime classified according to IS specifications ?
5. Write short notes on the following :
(a) Defects in timber
(b) Plywood
(c) Seasoning of timber
(d) Hard board.
6. (a) Differentiate between mild steel rods and HYSD Bars.
(b) Illustrate different market forms of rolled steel sections.
7. (a) Describe the manufacturing process of glass.
(b) What are the constituents of glass ? Give the functions of each of them.

8. (a) What are the various ingredients of paints ? State the functions of each of them.
- (b) What are the characteristics of good oil paints ?
- (c) Why are steel structures painted ? Describe the procedure of painting an old steel structure.

No. of Printed Pages : 05

Roll No.36.....

E71

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B Scheme) (Re-appear Only)

(CE)

CE301B

STRUCTURAL ANALYSIS-II

Time : 2½ Hours

[Maximum Marks : 75]

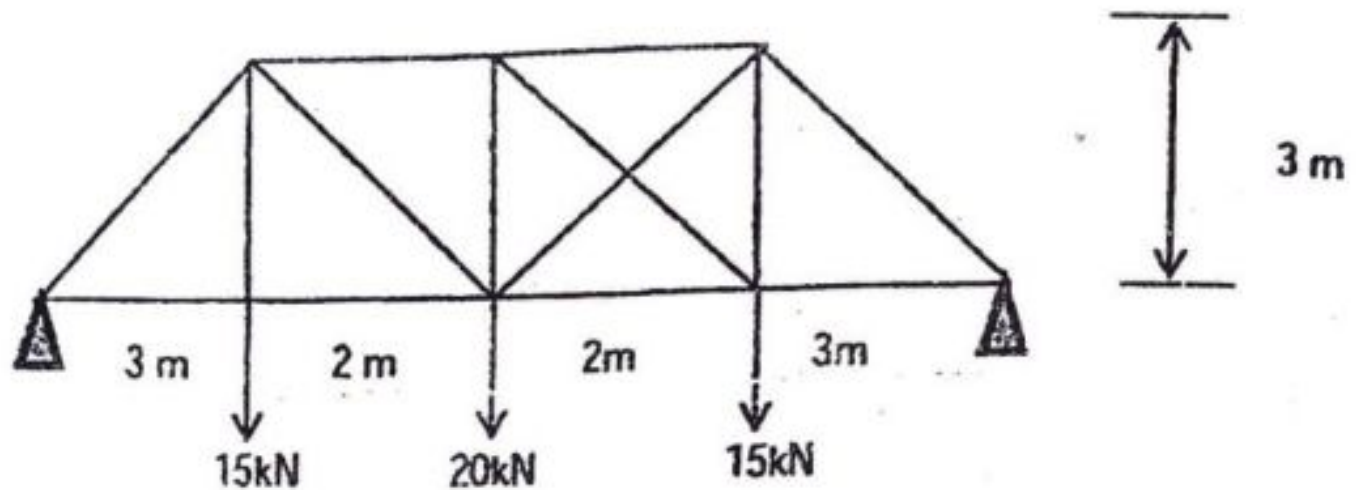
Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Assume any data if missing in the question paper.

(5-13/16)M-E71

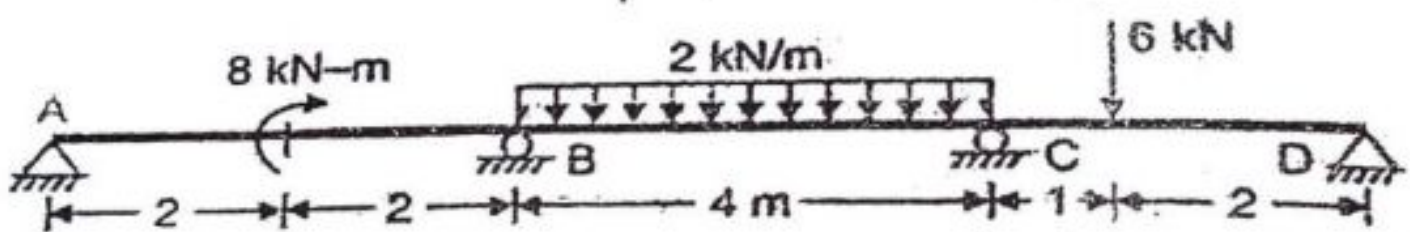
P.T.O.

1. (a) Determine the forces in the member of truss shown in fig.

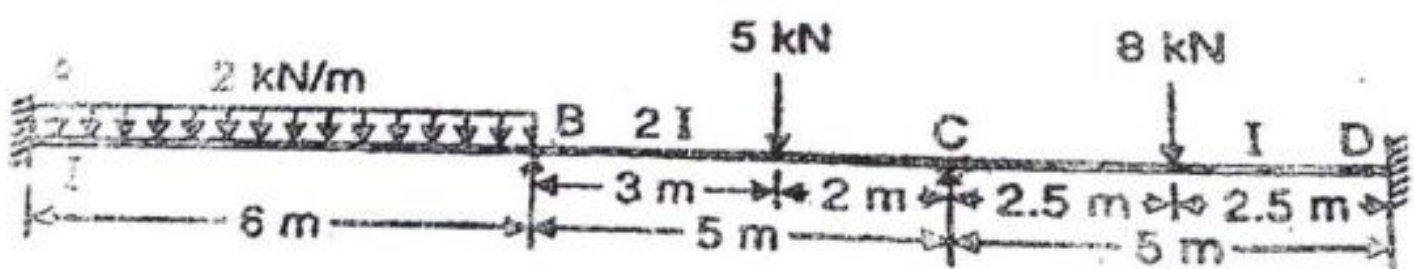


- (b) Write down the difference between static indeterminacy and kinematic indeterminacy.

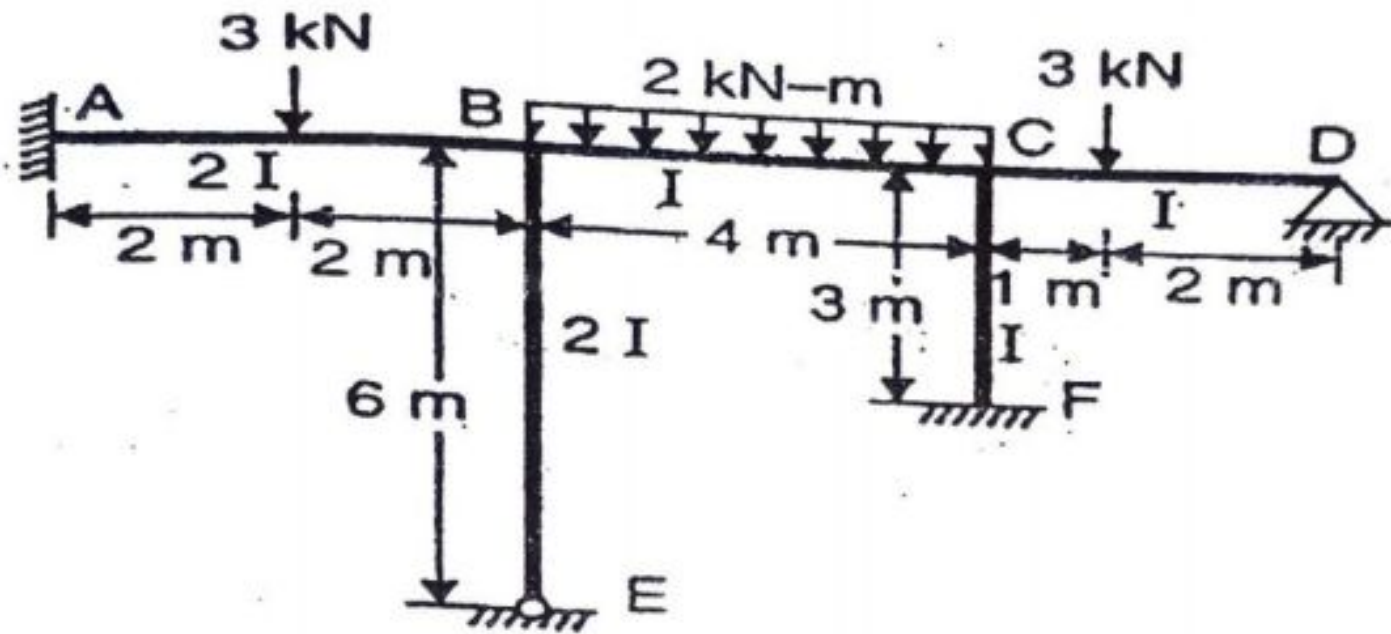
2. Analyse the continuous beam as shown in fig.



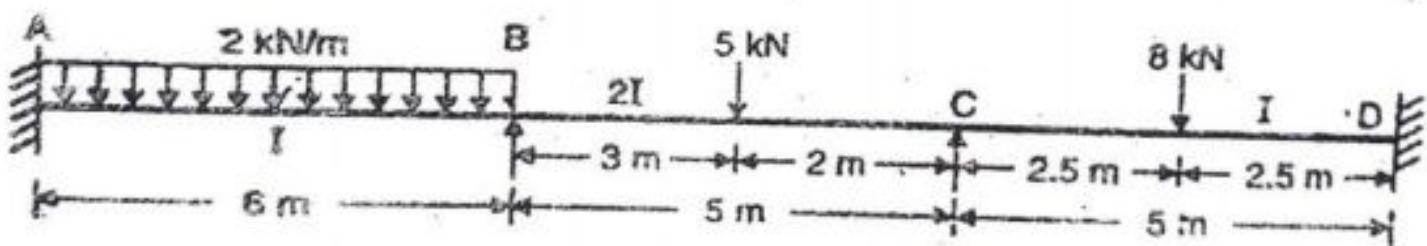
3. A continuous beam ABCD consists of three spans and is loaded as shown in fig. End A and D are fixed. Determine the bending moments at the supports and plot the bending moment diagram by slope deflection method.



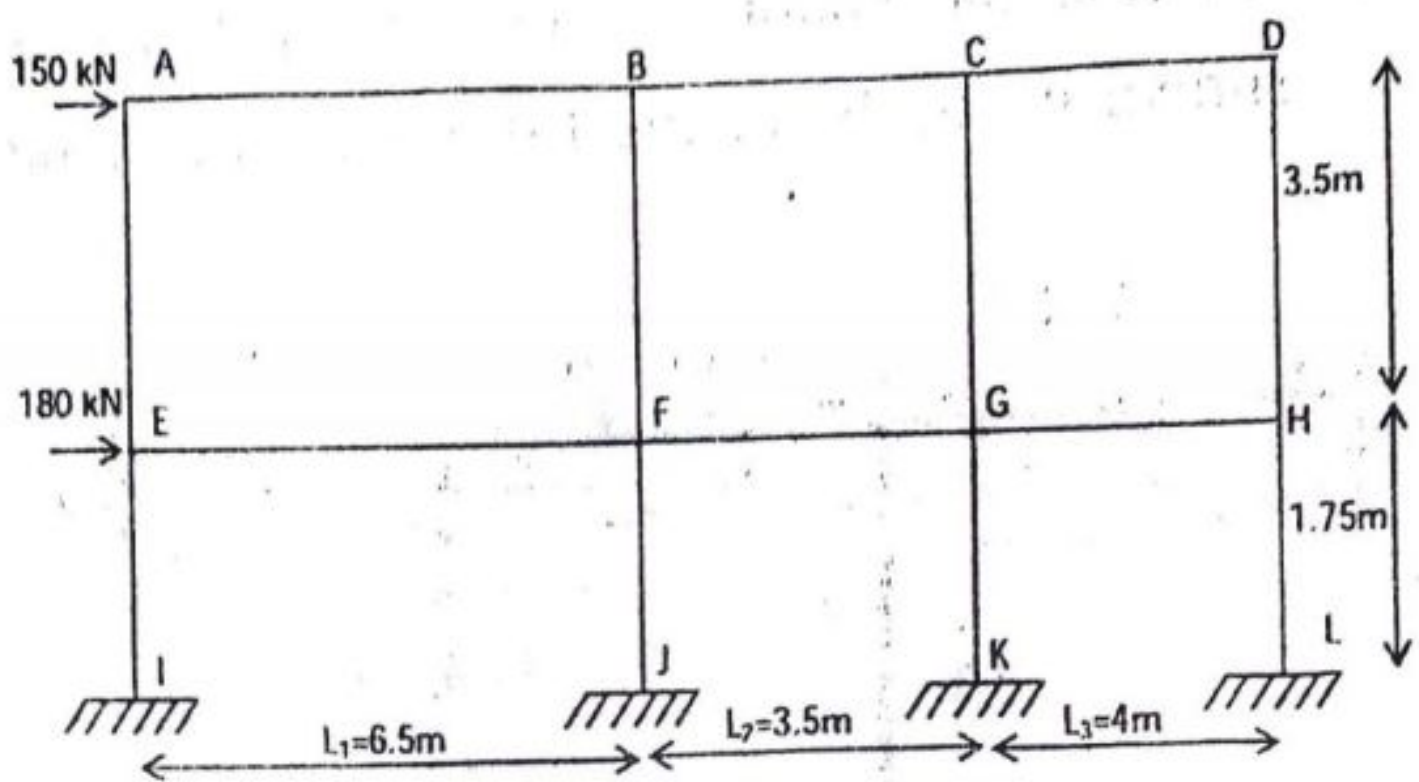
4. Analyse the continuous one storey frame as shown in fig. by moment distribution method.



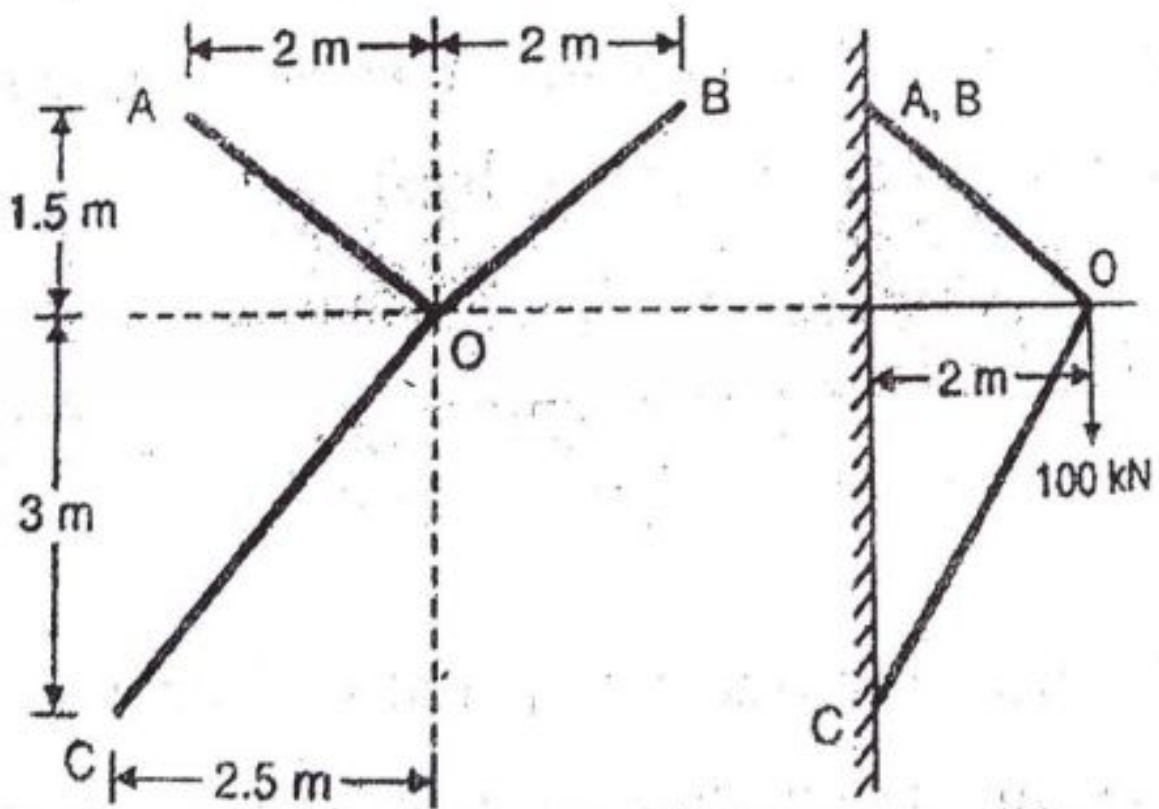
5. A continuous beam ABCD consists of three spans and is loaded as shown in fig. Ends A and D are fixed. Determine the bending moments at supports, using Kani's method. Also plot the bending moment diagram and deflected shape of the beam.



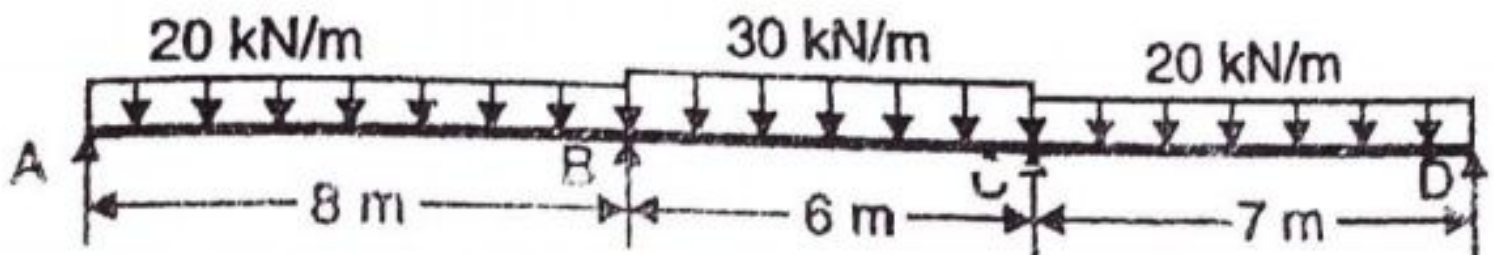
6. Analysis the frame by portal method assuming that all the columns have same area of cross-section.



7. Fig show two views of a tripod bracket. All connections are pinned. Find the forces in magnitude and nature in the three members due to a vertical load of 100 kN acting at O.



8. A three span continuous beam ABCD is loaded with loads as shown in fig. Determine the required plastic moment of resistance when the beam is of uniform section.



No. of Printed Pages : 04

Roll No.37.....

E73

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B Scheme) (Re-appear Only)

(CE)

CE305B

REINFORCED CONCRETE DESIGN-I

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Any data if missing can be suitably assumed. Use of scientific calculator is allowed. Use of Indian Standard is allowed.

(5-13/21)M-E73

P.T.O.

1. (a) Explain different concrete structural systems you know with the help of figure.
(b) What do you understand with limit state of serviceability ? Explain any *three*.
2. A reinforced concrete beam of size 300×600 mm with 25 mm effective cover has been cast using M 25 grade of concrete and Fe 415 grade of steel. It is reinforced with 3-20 mm diameter bar at bottom. Using working stress method determine the moment of resistance of the beam.
3. A reinforced concrete beam was cast over a span of 5 m using M 20 grade of concrete. It carried 50 kN/m uniformly distributed load throughout the span. The beam with the cross-section 300×600 mm was reinforced with 5-20 diameter Fe 415 grade of steel. Design the shear reinforcement for this beam using working stress method.

4. Design a reinforced concrete column 3.5 m high using M 25 grade of concrete, Fe 415 grade of steel and working stress method. The column carries 1500 kN service load and one side has been restricted to 300 mm from architectural consideration.
5. A reinforced concrete T beam having a flange width 1100 mm and thickness of 100 mm is reinforced with 4-25 mm diameter tension bars provided at a depth of 500 mm below the top of the flange in a 300 mm wide rib. Determine uniformly distributed load inclusive of self weight that the beam can safely support over a span of 7.5 m if the materials used are M 25 grade of concrete and Fe 550 grade of steel. Limit state method is to be used.
6. A slab of a hall is supported over a grid of beams measuring span 4×6 m. It has to carry a service live load 3kN/m^2 and dead load including finishes 2kN/m^2 . Using limit state method, M 20 grade of concrete and Fe 500 grade of steel, design an interior mid span of the slab.

7. A reinforced concrete beam of size 300×600 mm with 25 mm effective cover has been cast using M 25 grade of concrete and Fe 415 grade of steel. It is reinforced with 5-20 mm diameter bar at bottom. The beam carries uniformly distributed service load 15 kN/m over a span of 7.5 m. Using limit state method determine the distance where (i) 2-bars and (ii) 3-bars can be bent from the consideration of flexure, anchorage and bond. Show the details with the help of figure.
8. A reinforce concrete column 450 mm diameter has been reinforced with 6-20 mm diameter Fe 415 grade of steel and 8 mm diameter helix with pitch 75 mm. If the column was cast using M 25 grade of concrete determine the ultimate load the column can carry.

No. of Printed Pages : 04

Roll No.38.....

E74

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B Scheme) (Re-appear Only)

(CE)

CE307B

ENVIRONMENTAL ENGINEERING-I

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

(5-14/1) M-E74

P.T.O.

1. (a) Draw layout of water scheme.
(b) Write about the Infiltration galleries as a source of water supply.
2. (a) Population pertaining to a town is given below. Find the population in 2050 :

Year	:	1970	1980	1990	2000
Population	:	45000	55265	75100	90000

(b) Explain the logistics curve method of population forecasting.
3. (a) Give a list of chemical parameters of water.
(b) Classify water bodies.
4. (a) Derive an expression of settling velocity of particles in turbulent flow.
(b) Name the coagulants. Write their chemical equations also.

5. (a) The analysis of a water shows the following : free CO_2 : 3 ppm, alkalinity : 65, non-carbonated hardness : 95 ppm, total magnesium : 10 ppm, assume that it is possible to remove all but 30 ppm of carbonated hardness with lime and that the finished water is to have total hardness of 80 ppm. Determine the amounts of chemicals required per million liters of water.
- (b) Describe the methods of demineralization.
6. (a) Explain the Hardy-cross method of water distribution.
- (b) Explain, how do you determine the storage capacity of balancing reservoir by mass curve methods (a) for 24 hour pumping (b) for 15 hour pumping from 6 A.M. to 9 P.M. ?

7. (a) Discuss about the characteristics and efficiency of centrifugal pumps.
- (b) Give a list of fixtures used in water supply system.
8. Write short notes on the following :
- (i) RO
- (ii) Flocculation.

No. of Printed Pages : 04

Roll No.39.....

E75

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B Scheme) (Re-appear Only)

(CE)

CE309B

TRANSPORTATION ENGINEERING-I

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

(5-14/3) M-E75

P.T.O.

1. (a) Discuss the role of transportation in the economic growth of country. Explain specific functions of different mode of transportation.
- (b) Describe the various surveys to be carried out before planning a highway system for a given area. Explain briefly.
2. (a) What are the different types of bituman materials used in road construction ? Under which circumstances each of the materials are used ?
- (b) What do you understand by aggregate impact value of aggregate ? How can it be calculated ? Explain the procedure with the help of neat sketch.
3. (a) How many types of sight distance exists on a pavement ? Explain the factors over which each one of the sight distance depends.

- (b) The design speed of a road is 65 kmph, the friction coefficient is 0.36 and reaction time of driver is 2.5 sec. Calculate the value of (a) Head light distance and (b) Intermediate sight distance of road.
4. (a) Explain daily variation in temperature and warping stresses in CC Pavements. Also describe all types of stress in rigid pavements.
- (b) List and explain various design factors affecting design and performance of CC Pavements.
5. Explain the following :
- (i) PCU Value
 - (ii) Level of service
 - (iii) 85th percentile speed
 - (iv) Spot speed
 - (v) Running speed.

6. List the various stages of RSA. Explain the points of discussion for different stages of road safety audits.
7. (a) Mention the specification of materials construction steps and quality control tests for laying of bituminous surface dressing.
(b) Describe the typical components of pavement with their functions.
8. Write brief notes on the following types of distresses in bituminous pavement : Ravelling, Edge Breaking, Alligator Cracks, Shear failure, Mud Pumping.

E76

B.Tech. EXAMINATION, 2020

(Fifth Semester)

(B Scheme) (Re-appear Only)

(CE)

CE311B

GEO-MECHANICS

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Missing data, if any, may suitably be assumed and stated, clearly. Supplement your answers with suitable, proportionately drawn neat sketches, wherever required. Use of Scientific Calculator is permitted.

1. (a) Define Plasticity index and Liquidity Index.
(b) Discuss, in detail, Indian Standard Soil Classification System.
2. (a) Discuss Elastic properties of Rocks.
(b) What is Particle size distribution curve ? What does it represent ? Show various types of soils on it. Discuss its importance. Describe the term D_{10} , D_{30} and D_{60} , C_u and C_c .
3. (a) Explain Falling Head Permeability Test and derive the formula for the determination of coefficient of permeability.

- (b) Define seepage pressure. In which direction, seepage pressure acts ? Derive its relationship with Hydraulic Gradient. Deduce the expression for effective pressure in a soil mass subjected to seepage pressure.
4. (a) Discuss the factors affecting permeability.
(b) Discuss the phenomenon of piping and heaving.
5. (a) Describe Standard Proctor Test. Discuss Water Content-Dry Density relationship. Also describe Zero Air Void Line, Optimum Moisture Content and Maximum Dry Density. How are these important for highway construction ?
(b) Discuss, how the compaction curve changes for different types of soils ?
6. (a) Discuss, how Terzaghi has demonstrated the mechanics of consolidation by means of the piston and spring analogy ? On this basis define excess pore pressure, consolidation pressure, equilibrium void ratio, hydrodynamic lag and primary consolidation.
(b) What is meant by Pre-consolidated Soil and Pre-consolidation Pressure ?
7. (a) By means of Boussinesq Stress Distribution Theory, describe, how would you prepare the Stress Isobar Diagram ? Discuss the concept of Pressure Bulb.
(b) Prove that the maximum vertical stress on a vertical line at a constant radial distance ' r ' from the axis of a vertical load is induced at the point of intersection of the vertical line with a radial line at $\beta = 39^\circ 15'$ from the point of application of concentrated load. What will be the value of vertical stress and shear stress at that point ?
8. (a) What do you mean by Shear Strength of Soil ? Discuss Mohr Coulomb failure theory.
(b) Discuss briefly Direct Shear Test and its test results.

No. of Printed Pages : 04

Roll No.51.....

G143

B. Tech. EXAMINATION, 2020

(Seventh Semester)

(B Scheme) (Main & Re-appear)

(CE)

CE405B

IRRIGATION ENGINEERING-I

Time : 2½ Hours]

[Maximum Marks : 75

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Note : Attempt *Four* questions in all. All questions carry equal marks. Assume any missing data suitably.

(5-07/19)M-G143

P.T.O.

1. (a) Explain the factors affecting the crop water requirements.
(b) Distinguish among delta, duty and base period.
(c) Briefly describe sprinkler and drip irrigation.
2. (a) Determine the frequency of irrigation from the following data :
 - (i) Field capacity of soil = 30%
 - (ii) Permanent wilting point = 15%
 - (iii) Density of soil = 1.5 g/cm^3
 - (iv) Depth of root zone = 70 cm
 - (v) Daily consumptive use of water = 17 mm
(b) What do you understand by culturable command area ?
3. Find the balancing depth for a canal section having the following data :
 - (i) Base width of canal = 15 m

- (ii) Side slope in cutting = 1 : 1
 - (iii) Side slope in banking = 2 : 1
 - (iv) Top width of bank = 3 m
 - (v) Height of bank above ground level = 3 m
4. Explain the terms proportionality, setting and sensitivity of outlet.
5. (a) What is guide bank ? Explain with the help of labeled neat sketch.
- (b) Distinguish among bank pitching, pitched island and launching apron.
6. Design lined canal to carry 200 cumec discharge with the following data :
- (i) Angle of repose of soil = 45°
 - (ii) Lacey's silt factor = 2.2
 - (iii) B/D ratio = 3 where B = Bottom width and D = Depth of flow
 - (iv) Mannings' N = 0.018

7. Using Darcy's law develop the equation for the steady flow in a confined aquifer.
8. A tube well of diameter 30 cm penetrates fully an unconfined aquifer. Determine the discharge of the well having draw down of 3 m at well and coefficient of permeability as 0.05 m/s. Take radius of circle of influence = 300 m and effective length of strainer = 10.5 m.

No. of Printed Pages : 05

Roll No.52.....

G144

B. Tech. EXAMINATION, 2020

(Seventh Semester)

(B Scheme) (Main & Re-appear)

(CE)

CE407B

ESTIMATING AND COSTING

Time : 2½ Hours]

[Maximum Marks : 75

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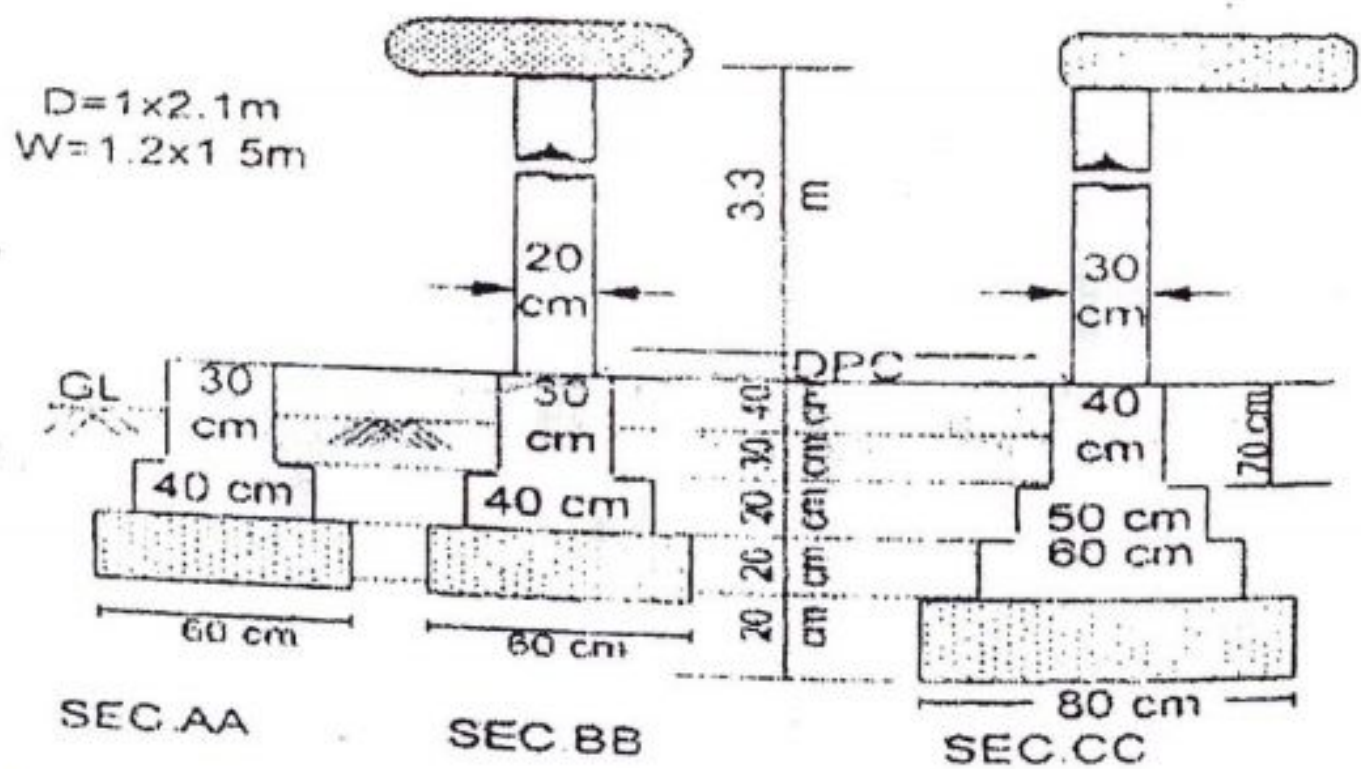
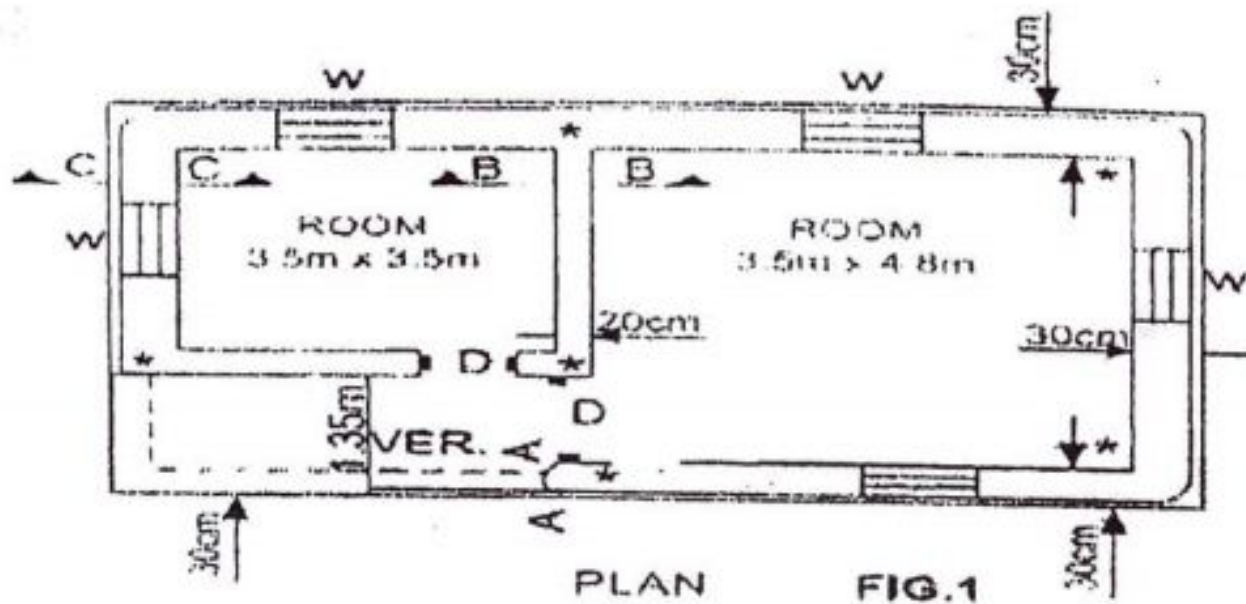
Note : Answer *Four* questions in all. All questions carry equal marks. Assume any data if necessary.

(5-08/4) M-G144

P.T.O.

1. Figure below shows a plan and section. Estimate the quantities and cost of following items using Long wall and Short wall method :

- Earthwork in excavation @ ₹ 6,000 per Cum
- Concrete in foundation @ ₹ 7,000 per Cum
- Brick work in foundation and plinth @ ₹ 3,500 per Cum
- Brick work in superstructure @ ₹ 4,000 per Cum. (Sec. A-A is for the wall in Verandah).



M-G144

2. Estimate the quantities of earthwork for a portion of road for 400 m length from following data :

Formation width of road is 10 m. Side slopes are 2 : 1 in banking and cutting.

Station	Distance (m)	R.L. of Ground	R.L. of Formation
1	1000	51.00	52.00
2	1050	50.90	-
3	1100	50.50	-
4	1150	50.80	-
5	1200	50.60	Downward
6	1250	50.70	gradient of
7	1300	51.20	1 in 150
8	1350	51.40	-
9	1400	51.30	-
10	1450	51.00	-
11	1500	50.60	-

3. What is the purpose of General specification ?
Give general specification of all components of a second class building.
4. Write detailed specification of any *three* of the following items :
 - (a) Earthwork in irrigation channels and roads
 - (b) Madras Terrace Roof
 - (c) Random rubble stone masonry
 - (d) Mosaic or Terrazo floor
 - (e) Plastering Cement mortar or Lime mortar.
5. Estimate the quantities of materials required for a R.C.C. roof slab 12 cm thick with 1.5% reinforcement for a room having internal dimensions of 6×5 m. Estimate the cost of construction of the roof slab with suitable rates of materials and taking labour rate of laying including centering and shuttering etc., as ₹ 100 per cum of RCC work.

6. Explain different types of contracts used in construction. List their advantages and disadvantages.
7. Differentiate between administrative and technical sanction. What are the major reasons of arising dispute between client and contractor ? How dispute resolution is done in construction projects ?
8. Explain the importance of detailed feasibility report for a project. Discuss different components of detailed feasibility report.

No. of Printed Pages : 04

Roll No.53.....

G151

B. Tech. EXAMINATION, 2020

(Seventh Semester)

(B. Scheme) (Main & Re-appear)

(CE)

CE465B

GROUND WATER ENGINEERING

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Assume if any missing data.

(3-20/6) M-G151

P.T.O.

1. (a) Explain, how the water is stored into the groundwater reservoir ?
(b) Write the types of aquifer.
2. (a) Describe the gravity, seismic and magnetic method of Hydro-geologic investigation.
(b) Derive an expression for 3D flow of ground water.
3. A 30 cm diameter well penetrates 25 m below the static water table. After 24 hours of pumping @ 5400 liter/minutes, the water level in a test well at 90 m is lowered by 0.53 m, and in a well 30 m away the draw down is 1.11 m (a) What is the transmissibility of the aquifers ? (b) Also determine the draw down in the main well.
4. (a) Describe the widely used tube well with the help of neat sketch.
(b) Write the methods of well development.

5. Elaborate the procedure of Geomorphologic, Geological and structural, and Soil and Micro-Biological surface investigation method for ground water.

6. (a) A well penetrates into an unconfined aquifer having a saturated depth of 100 m. The discharge is 250 litres per minute at 12 metres draw down. Assuming equilibrium flow condition and a homogeneous aquifer, estimated the discharge at 18 metres draw down. The distance from the well where the draw down influences are not appreciable may be taken to be equal for both the case.

(b) Explain the terms—leaky aquifers, partially penetrated and fully penetrated aquifers.

7. (a) Write the methods of artificial recharge of groundwater.
- (b) Give a list of groundwater modelling. Explain their applications also.
8. Write short notes on the following :
- (a) Saline Water
- (b) Darcy's Law
- (c) Hydrological Cycle.

No. of Printed Pages : 06

Roll No.68.....

18C74

B. Tech. EXAMINATION, 2020

(Third Semester)

(C Scheme) (Main & Re-appear)

(CE)

CE203C

Surveying

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Assume any other missing data suitably.

(5-19/13)M-18C74

P.T.O.

1. (a) Define Surveying.
(b) What are the principles of surveying ?
(c) Differentiate between the following terms :
 - (i) Base line and check line
 - (ii) Main station and tie station
 - (iii) Chainage and offset.
2. (a) Name four methods of plane surveying.
(b) What do you understand by WCB and QB of a line ?
(c) Find out the station affected by the local attraction and work out the corrected bearing of the lines. The following are the observed bearing of the lines of a traverse ABCDEA with a compass in a place where local attraction was suspected :

Side	Fore bearing	Back bearing
AB	191°45'	39°30'
BC	22°15'	222°30'
CD	22°15'	200°30'
DE	242°45'	62°45'
EA	330°15'	147°45'

Also compute the interior angles of the traverse.

3. (a) Define Levelling. What are the uses of levelling ?
- (b) What do you mean by radiometric and spatial resolution ? Give examples.
- (c) The following staff readings were taken with a level. The instrument having been shifted after 4th, 7th and 10th readings. R.L. of the starting B.M. is 100.00 m. Enter the readings in the form of a level

book page and reduce the level by the H.I. method and apply the usual checks :

1.65, 2.74, 2.83, 2.27, 3.64, 1.38, 0.96, 1.64, 2.85, 2.84, 2.68 and 2.26.

4. (a) What are the different characteristics of contours ?
(b) Derive an expression to get the difference in elevation between instrument station and the object under observation when base of the object is accessible in trigonometrical leveling.
5. (a) Define Tacheometry.
(b) Explain the procedure to determine the tacheometric constants by movable hair method.
(c) It was required to determine the distance between two points A and B by a tacheometer fitted with an anallactic lens.

With the instrument at A and staff at B, the observations made were a vertical angle of $+ 9^{\circ}46'$ and staff intercept of 1.915 m. What is the horizontal distance AB ? Later it was found that the constants of the instrument were 100 and 0.5. What would be the percentage error in the horizontal distance computed ?

6. (a) Define traversing.
(b) Give the application of traverse survey.
(c) Explain the methods of measuring horizontal angle using theodolite.
7. How do you determine the intervisibility of triangulation stations ? Two triangulation stations A and B are 50 km apart and have elevations of 188 m and 185 m respectively. Find the minimum height of signal required at B so that the line of sight may not pass nearer the ground than 2 m. The intervening ground may be assumed to have a uniform elevation of 150 m.

8. A circular curve has a 200 m radius and 65° deflection angle. What is its degree (i) by arc definition and (ii) by chord definition. Also calculate : (a) length of curve, (b) tangent length, (c) length of chord, (d) apex distance, and (e) mid ordinate.

No. of Printed Pages : 04

Roll No.69.....

18C75

B. Tech. EXAMINATION, 2020

(Third Semester)

(C Scheme) (Main & Re-appear)

(CE)

CE205C

FLUID MECHANICS

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Assume any data if missing.

(5-19/16)M-18C75

P.T.O.

1. (a) Find out the minimum size of glass tube that can be used to measure water level if the capillary rise in the tube is to be restricted to 2 mm. Consider surface tension of water in contact with air as 0.073575.
(b) What do you understand by Cavitation and Compressibility ?
2. (a) What do you understand by Capillary Fall and Capillary Rise ? Derive the expression for them.
(b) Find the surface tension in a soap bubble of 30 mm diameter when the inside pressure is 1.962 N/m^2 above atmosphere.
3. (a) How will you determine the metacentric height of a floating body experimentally ? Explain with neat sketch.
(b) Define the terms—meta centre, centre of buoyancy, gauge pressure and absolute pressure.

4. (a) Differentiate between the following :
- (i) Simple and differential manometers.
 - (ii) Compressible and incompressible flow.
 - (iii) Laminar and turbulent flow.
- (b) Describe the stability of floating body concept with the help of sketch.
5. What do you understand by major loss and minor losses ? Explain all types of major and minor losses in pipes.
6. (a) Explain the following :
- (i) Energy gradient line
 - (ii) Pitot tube
 - (iii) Energy correction factor.
- (b) What do you understand by flow measuring devices ? List all types of flow measuring device. Explain the expression of flow measured by venturimeter.

7. (a) Explain the concept boundary layer separation. What is the effect of pressure gradient on boundary layer separation ? Explain with the help of sketch.
- (b) Define the terms—Laminar boundary layer, Turbulent boundary Layer, laminar sublayer with neat sketches.
8. (a) What are the different methods of preventing the separation of boundary layer ?
- (b) What do you understand by drag and lift concept ? Distinguish between deformation drag and surface drag.

No. of Printed Pages : 04

Roll No. *720000*

18C76

B. Tech. EXAMINATION, 2020

(Third Semester)

(C Scheme) (Main & Re-appear)

(CE)

CE207C

**BUILDING CONSTRUCTION AND
MATERIALS**

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Assume any data if missing in the question paper.

(5-19/18)M-18C76

P.T.O.

1. (a) What are the constituents of good earthen brick ? Write their functions also.
(b) Write down any *five* characteristics of good building stone.
2. (a) How can you classify the rocks on the basis of physical and chemical parameters ? Explain in detail.
(b) What do you understand by the term seasoning ? Also write down any *two* methods for the seasoning of timber.
3. What is water repellent cement ? What component is responsible for such type of cements ? How does it differ from ordinary Portland Cement ?
4. Write down and explain all the testing of aggregates.

5. (a) What do you understand by the term used cavity wall ? Also write down the advantages and disadvantages of cavity wall.
- (b) Write down the various types of Ashlar masonry.
6. What are the factors affecting the selection of equipments for a building project ? Explain in detail.
7. (a) Differentiate between combiner footing and cantilever footing. Along with diagram.
- (b) Write a short note on any *two* types of concrete stairs.

8. Explain, how the following components of buildings are made damp-proof :

(a) Foundation

(b) Floors

(c) Walls.

18E71

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(C Scheme) (Main Only)

(CE)

(CE301C)

DESIGN OF STEEL STRUCTURES-I

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. The use of scientific calculator is allowed.

1. (a) Draw and explain the Stress strain curve for mild steel.
(b) Write down the advantages of welded connection over bolted connections.
(c) A 120 mm diameter and 6 mm thick pipe is welded to 14 mm plate by fillet weld. The pipe is subjected to a vertical load of 3 kN at 1.0 m from the welded end and a twisting moment of 1.2 kN-m. Design the joint.
2. (a) Explain different types of loading used during the design of steel structure.
(b) What do you understand by the Serviceability considerations in steel design ?
(c) Write down all types of connections, and explain bolted connections in detail.
3. (a) What do you understand by eccentric connections ?
(b) Explain the all types of failures for tension members.

- (c) Determine the tensile strength of a roof truss diagonal $100 \times 75 \times 10$ mm ($f_r = 250$ N/mm²) connected to the gusset plate by 20 mm dia. power driven rivets in one row along the length of the member. The short leg of the angle is kept outstanding.
4. (a) Write down the load considerations for the design of eccentric connections.
 (b) What do you understand by the terms :
 (i) Gross area
 (ii) Block shear failure ?
 (c) A double angle 2 ISA $90 \times 90 \times 10$ back to back is connected on one side of a gusset by 24 mm common bolts. Calculate the capacity of the section in tension and the number of bolts required to carry 85% capacity of the member.
5. (a) Explain the term buckling for compression members.
 (b) Design a column of effective length 5.50 m. It is subjected to an axial load of 1250 kN. Provided two channels back to back connected with battens by welded connections. Assume $f_y = 250$ MPa.
 (c) Design a beam of 4.5 m effective span, carrying a uniform load of 22 kN/m if the compression flange is laterally unsupported. Assume $f_y = 250$ N/mm².
6. (a) Write down the load consideration for the design of flexural members according to Indian Standards.
 (b) Design a built-up column with four angles. The column is 5 m long and supports an axial load of 550 kN. The ends of the column are held in position and restrained against rotation. Design a sustainable connecting system. Assume $f_y = 250$ MPa.
 (c) A simply supported steel joint with a 4.0 m effective span carries a uniformly distributed load of 30 kN over its span inclusive of self weight. The beam is supported laterally throughout. Select a suitable section and check its safety.
7. (a) What are the design consideration of gusseted base subjected to eccentrically loading ?

- (b) Explain the following for plate girder :
- Local buckling of web
 - Bearing stiffeners.
- (c) Design a suitable slab base for column section ISHB 200@365.9 N/m supporting an axial load of 350 kN. The base plate is to rest on concrete pedestal of M 20 grade.
8. (a) Write down different types of column bases.
- (b) Explain the following for plate girder :
- Local buckling of flange.
 - Joints between web and flanges plates.
- (c) Design a suitable base for column subjected to an axial load of 850 kN and a wind moment at 200 kNm. The column section ISHB 450@925N/m. The safe bearing pressure at concrete may be assumed to be 7500 kN/m².
9. (a) Define pitch, gauge length and lap length for steel connection with neat and clean diagram.
- (b) How many types of column bases are used to transfer the load to the soil ? Explain with sketch.
- (c) Write down any *four* design assumption for the design of plate girders.
- (d) What do you understand by the term battening and tie plates ? Also, explain the effective length of compression members with different end conditions.
- (e) Fill the blank space :
- The moment of the couple set up in a section of a beam by the longitudinal compressive and tensile forces are known as.....
 - For a rectangular section, the ratio of maximum and average shear stress is.....
 - Generally, the maximum deflection of the beam should not exceed.....

18E72**B. Tech. EXAMINATION, 2020**

(Fifth Semester)

(C Scheme) (Main Only)

(CE)

CE303C

STRUCTURAL ANALYSIS-II

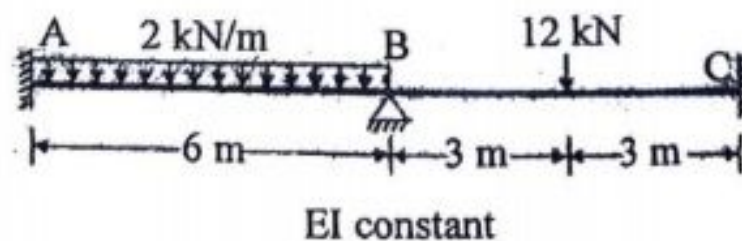
Time : 2½ Hours]

[Maximum Marks : 75

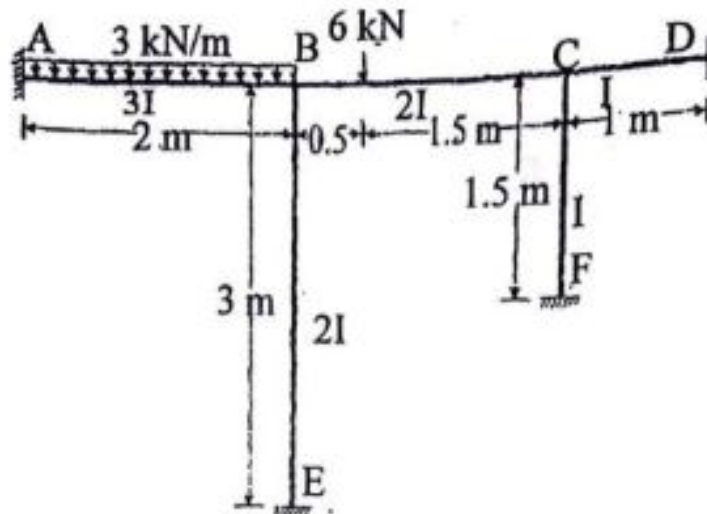
Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Any data if missing can be suitably assumed. The use of a scientific calculator is allowed.

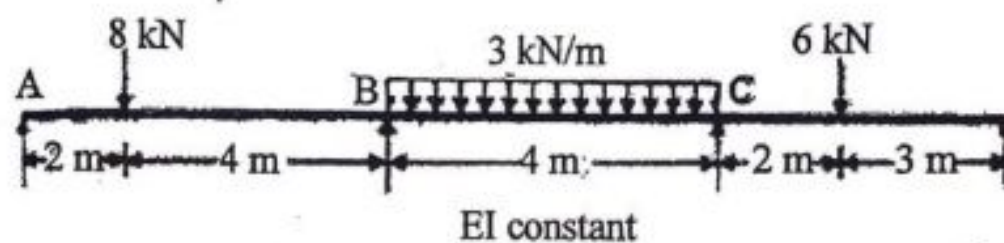
1. (a) What do you understand by the matrix method of analysis ? Also, explain why the Stiffness method is called the displacement method.
(b) Derive the relationship between force matrix method and displacement matrix method.
2. (a) Write down the boundary conditions of the flexibility method in detail.
(b) Write down and explain the steps involved in the flexibility matrix method of analysis.
3. (a) A beam ABC, 12 m long fixed at A and C and continuous over support B, as shown in Fig. Calculate the end moments and plot the bending moment diagram by slope deflection method :



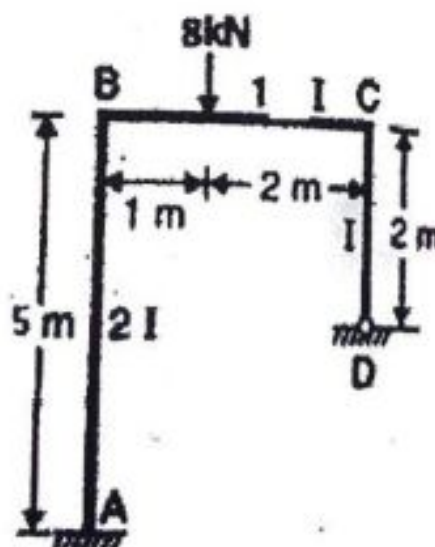
- (b) By slope deflection method draw the bending moment diagram and sketch the deflected shape of the frame as shown in fig. All members are of the same material.



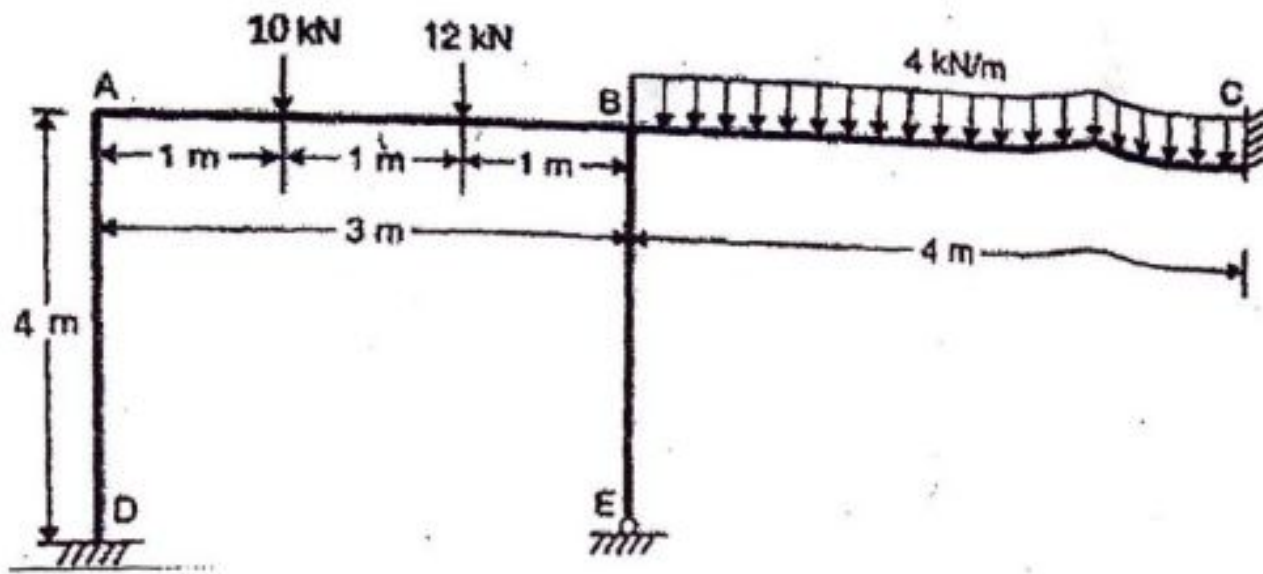
4. (a) A beam ABCD, 15 m long is continuous over three spans and is loaded as shown in Fig. Calculate the moments and reactions at supports by the moment distribution method.



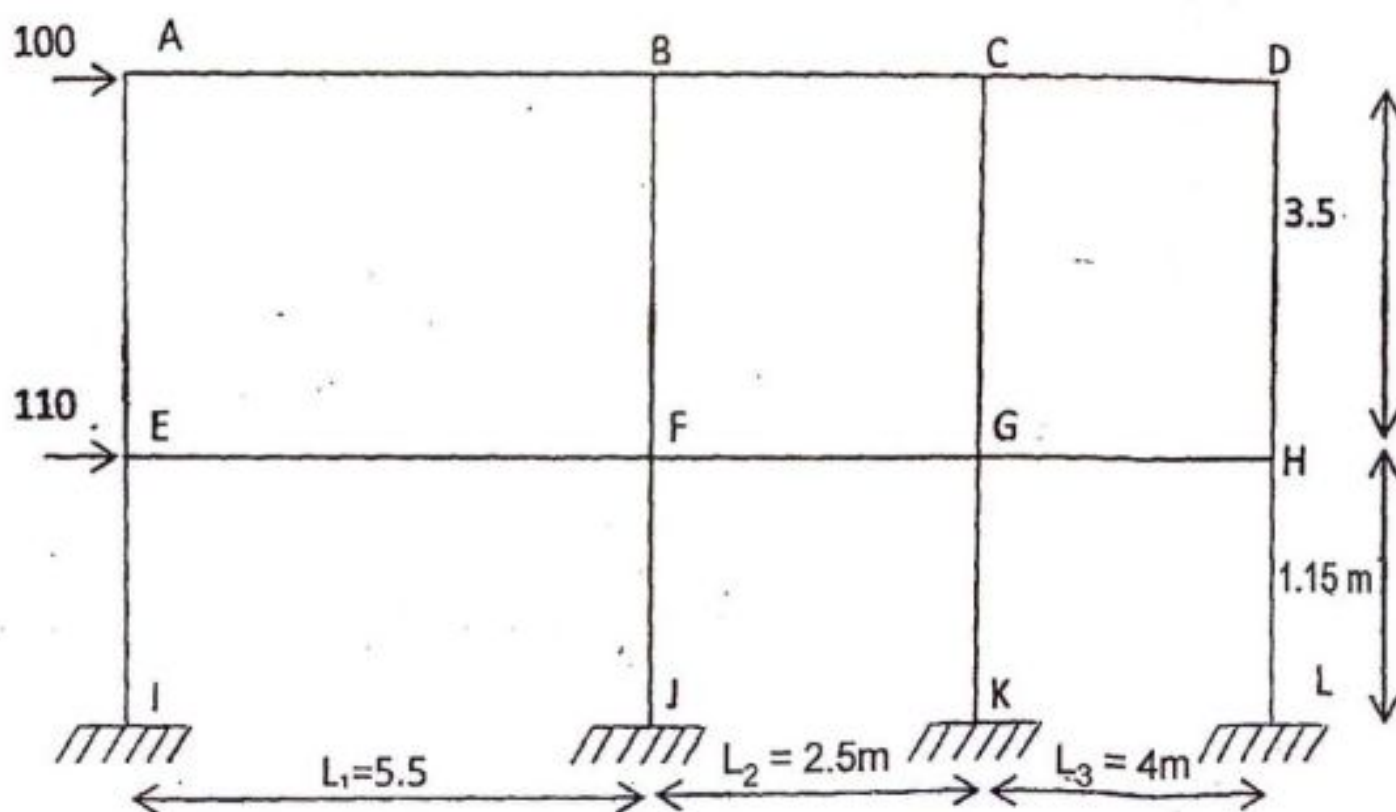
- (b) A portal frame ABCD is fixed at A and hinged at D. Draw the bending moment diagram due to a point load of 8 kN as shown in fig. by moment distribution method. Calculate the reactions and sketch the deflection shape of the frame.



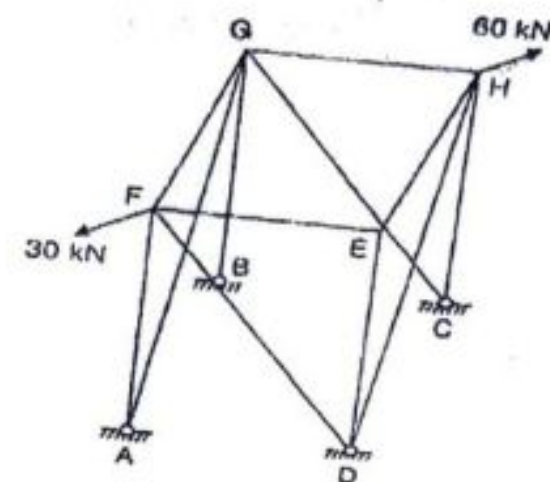
5. (a) What are the sway conditions for portal frames ? Explain all in detail.
- (b) A continuous beam shown in fig. has rigidly fixed ends C and D, is pinned at E and has rigid joints at A and B. The members are of uniform section and material throughout. Sketch the bending moment diagram for the frame, showing all important values. Also, find the values of horizontal and vertical reactions at D and E. Use Kani's method.



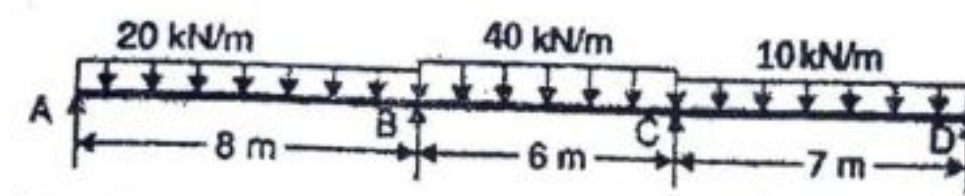
6. (a) Write down the difference between the portal frame method and the cantilever method.
- (b) Analyse the frame by portal method assuming that all the columns have the same area of cross-section.



7. (a) Explain the following :
- Equilibrium conditions for space frame
 - Stability conditions for space frame.
- (b) Find the forces in all the members of the space frame shown in Fig. Take $AB = 4.2$ m, $AD = 5.1$ m and $AF = 6$ m.



8. (a) What are the assumptions used during plastic analysis ?
- (b) A three-span continuous beam ABCD is loaded with loads as shown in fig. Determine the required plastic moment of resistance when the beam is of uniform section.



9. (i) Write down the advantages of the matrix method of analysis over Kani's method of analysis.
- (ii) What are the assumptions used during the slope deflection method of analysis ?
- (iii) Write down the non-sway conditions for portal frames.
- (iv) What do you understand by space frames ?
- (v) Explain static theorems of plastic analysis for beams.

No. of Printed Pages : 05

Roll No.87.....

18E73

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(C Scheme) (Main Only)

(CE)

CE305C

REINFORCED CONCRETE DESIGN-I

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Use of Indian Standards is allowed.

(5-21/19)M-18E73

P.T.O.

1. A reinforced concrete simply supported beam of rectangular cross-section of size 300×500 mm effective is reinforced with 4×20 mm ϕ bars at tensile face and 4×12 mm ϕ bars at compression face at effective covers 50 mm, respectively. Determine the (i) moment of resistance of the section and (ii) the safe uniformly distributed load the beam can support in addition to the self weight over an effective span of 6 m. M 20 grade of concrete and Fe 500 grade of steel have been used. (WSM).
2. A reinforced concrete floor system consists of a 100 mm thick slab cast monolithically with beams having an effective span of 6 m and spaced 3 m centre to centre. The superimposed load on floor is 6 kN/m^2 . Design the beam using M 20 grade concrete and Fe 250 grade of steel (WSM).

3. Design a beam using limit state whose width is restricted to 250 mm to support ultimate bending moment 300 kNm with M 25 grade of concrete and Fe 415 grade of steel.
4. Design a beam using limit state of 300×600 mm (overall) to support ultimate bending moment 50 kNm, shear force 50 kN and torsion 50 kNm with M 25 grade of concrete and Fe 415 grade of steel.
5. Design a cantilevered portico slab of 5 m width and 2 m clear span of a residential building using LSM with M 20 grade concrete and Fe 500 grade of steel.
6. Design an interior panel of a flat slab supported on circular columns spaced 6 m centre to centre in both directions for imposed load 3 kN/m^2 and finishing load 1 kN/m^2 using LSM with M 20 grade concrete and Fe 415 grade of steel.

18E74

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(C Scheme) (Main Only)

(CE)

CE307C

CONSTRUCTION ENGINEERING AND MANAGEMENT

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Draw neat diagrams wherever applicable. Calculator may be used for attempting numerical questions.

1. (a) What is definition of "Project Life Cycle" ? List down the stages of construction project life-cycle.
(b) What is the role of project manager in project planning, monitoring and control of a construction project ?
2. What is Work Break Down Structure (WBS) ? Draw a WBS of a single storeyed residential building of floor area 150 sqm. The exterior and interior walls are of concrete block. The roof is constructed of reinforced concrete slab with water proofing. The floor is a concrete slab on grade with tile finish. Interior finish on all walls is paint. Assume other details.

3. Highlight advantages of network as project scheduling techniques. Explain activity on link and activity on node representation of network, forward pass and backward pass to find project duration. Application of each of the techniques.

4. (a) The activities for construction project are shown in the table :

Activity	Duration (days)	Preceding activity
A	2	—
B	6	A
C	10	A
D	4	A
E	8	B
F	6	B, C
G	3	C, D
H	6	E, F
I	2	G, H

Construct an activity on arrow (AOA) diagram.

- (b) Compute the four schedule dates (Early start, early finish, late start and late finish) and Total Float for each activity and identify the critical path.
5. (a) What are the merits of Ready-Mix Concrete over the onsite concrete mixers in a construction project ? Discuss various types of vibrator equipment used for concreting in column, beam and slab in a building construction.
- (b) Explain the project's S-curve and discuss, how the earned value method (EVM) is used to control the time, cost and productivity of construction projects ?
6. In the bar chart given ahead for a construction project, the required number of labour resources has been shown along bar for the activity. "A (10)" means activity A has a requirement of ten labours on all weeks. Draw the resource loading diagram for the project and identify the peaks and valleys.

Week Activity	1	2	3	4	5	6	7	8	9
A	10	10							
B		8	8	6					
C				2	6				
D				2	6	10	10	8	
E								6	6

7. Construction sites can be considered as being one of the most hazardous types of working environments. For each item in the list of common construction site hazards in Table below, describe one type of accident that might happen, a possible injury that could result and one action the contractor might take to protect the worker or the public against the hazard.

S.No. Some of common construction site hazards

1. Lifting equipment
2. Scaffoldings
3. Trenches and other excavations
4. Welding and cutting
5. Electricity

8. (a) Explain, how Building Information Modelling is integrated in project management ?
- (b) What is the use of quality circle ? Describe total quality control in construction ?

9. Explain briefly any *five* of the following :

- (a) Engineered projects
- (b) Lump sum contract
- (c) Programme Evaluation and Review Techniques (PERT)
- (d) Site organization
- (e) Equipment productivity
- (f) Line of Balance (LOB)
- (g) Lean construction

18E75

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(C Scheme) (Main Only)

(CE)

CE309C

GEO-MECHANICS

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Missing data, if any, may suitably be assumed and stated, clearly. Supplement your answers with suitable, proportionately drawn neat sketches, wherever required. Use of Scientific Calculator is permitted.

1. (a) Discuss the importance of Engineering Geology, in carrying out Civil Engineering Projects.
(b) Discuss the effects of weathering agents on the rocks and how the soil is formed ?
2. (a) Define Void Ratio, Porosity and derive their relationship.
(b) What is Particle size distribution curve ? What does it represent ? Show various types of soils on it. Discuss its importance. Describe the terms D_{10} , D_{30} , D_{60} , C_u and C_c .

3. (a) Explain Falling Head Permeability Test and derive the formula for the determination of coefficient of permeability.
 (b) Derive the formula for Equivalent Permeability of a stratified soil deposit, if the flow is perpendicular to the bedding planes.
4. (a) Define seepage pressure. In which direction, seepage pressure acts ? Derive its relationship with Hydraulic Gradient. Deduce the expression for effective pressure in a soil mass subjected to seepage pressure.
 (b) A large open excavation was made in a stratum of stiff clay with a saturated unit weight of 18 kN/m^3 . When the depth of excavation reached 8 m, the bottom rose gradually, cracked and was flooded from below by a mixture of sand and water. Subsequent borings showed that the clay was underlain by a bed of sand with its surface at a depth of 13 m. Calculate the elevation to which the water would have risen above the stratum into a drill hole before the excavation was started.
5. (a) Describe Standard Proctor Test. Discuss Water Content-Dry Density relationship. Also describe Zero Air Void Line, Optimum Moisture Content and Maximum Dry Density. How are these important for highway construction ?
 (b) Discuss the difference between Standard Proctor Test and Modified Proctor Test.
6. (a) Discuss, the mechanics of consolidation by means of the piston and spring analogy, as demonstrated by Terzaghi. On this basis define excess pore pressure, consolidation pressure, equilibrium void ratio, hydrodynamic lag and primary consolidation.
 (b) What is meant by Over Consolidated Soil and Pre-consolidation Pressure ?
7. (a) By means of Boussinesq Stress Distribution theory, describe Stress Isobar Diagram. Also discuss the concept of Pressure Bulb.

- (b) Prove that the maximum vertical stress on a vertical line at a constant radial distance ' r ' from the axis of a vertical load is induced at the point of intersection of the vertical line with a radial line at $\beta = 39^\circ 15'$ from the point of application of concentrated load. What will be the value of vertical stress and shear stress at that point ? Hence find the maximum vertical stress on a line situated at $r = 3$ m, from the axis of a concentrated load of value 40 kN.
8. (a) What do you mean by Shear Strength of Soil ? Discuss Mohr Coulomb failure theory.
- (b) Discuss briefly Direct Shear Test and its test results.
9. (a) Define the following densities of soil :
- Bulk Density
 - Dry Density
 - Submerged Density.
- (b) Define Liquid Limit and Plastic Limit of the soil.
- (c) What is Seepage Velocity ? Derive its relation with Discharge Velocity.
- (d) Discuss the difference between Compaction and Consolidation.
- (e) Discuss Boussinesq's equations for Vertical Stress σ_z and Tangential Stress τ_{rz} at a point P, which is at a radial horizontal distance ' r ' from the axis of the point load Q and vertical distance ' z ', from the point of application of load Q .