CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

Fifth Semester B.E. Degree Examination, Jan./Feb. 20
Management and Engineering Economics

Time: 3 hrs.   Max.

Note: *Answer any FIVE full questions, choosing ONE full question from each*

Module-1

1   a.   Define Management. Differentiate between Administration and Management.
    b.   Explain briefly the purpose and planning.

OR

2   a.   Briefly explain , whether management is a Science (or) Art.
    b.   Explain briefly the main steps involved in planning.

Module-2

3   a.   Explain with a neat diagram, line and staff organization.
    b.   Briefly explain the techniques of selection.

OR

4   a.   Describe briefly the essentials of a Sound Control System.
    b.   Briefly explain the Maslow's Hierarchy of needs.

Module-3

5   a.   Explain how Cash Flow Diagrams (CFD) are helpful to the decision maker
         and solve Engineering Economics problems and give borrower's and lender
         for cash flow diagram.
    b.   A person is planning for his retired life. He has 10 more years of service. H
         deposit 20% of his salary which is Rs 10,000/- at the end of the First year an
         wishes to deposit the same amount (Rs 10,000) with an Annual increase of R
         next 9 years with an interest rate of 20%. Find the total amount at the end of
         the above series.

OR

6   a.   State and explain Law of Returns.
    b.   Determine the effective interest rate in the following cases :
         i)   Nominal rate of 12% compounded monthly with time interval of one yea
         ii)   Nominal rate of 18% compounded weekly with a time interval of one yea
         iii) Nominal rate of 13% compounded monthly with a time interval of two y
         iv)   Nominal rate of 9% compounded semi annually with a time interval of tw

Module-4

7   a.   Two motorcycles of brand "A" and "B" are available on the following terms

Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

b. A stand by lighting generator is required for a shop. Two types are ava
generators have a life of 4 years and the interest rate is 15% per year, which o
equivalent annual cost.

	Type - 1	Type - 2
First - Cost	Rs 5,000/-	Rs 3,200/-
Salvage value	Rs 1,000/-	- Nil -
Annual operating costs	Rs 780/-	Rs 950/-

OR

8 a. Compare the two investment proposals given below, if the firms MARR is 15
the two proposals is 10 years. Compare using IRR.

Investment proposal	Initial Cost	Annual Return
Proposal 1	5,50,000/-	1,40,000/-
Proposal 2	6,25,000/-	1,60,000/-

b. A crane can be taken on lease for a project for 3 years for Rs 1,80,000/
maintenance included. It can also be purchased for Rs 2,40,000/- and be sol
3 years for Rs 1,00,000/-. Maintenance costs are expected to be Rs 5,000/-
first two years and Rs 10,000/- for the third year payable at the end of eacl
interest rates would the two alternatives be equivalent?

Module-5

9 a. Briefly explain the functions of Estimating department.
   b. A CNC machine costs Rs 30,00,000/- is estimated to serve for 8 years after w
   value is estimated to be Rs 2,50,000/- Find
   i) Depreciation fund at the end of the 5th year by Fixed percentage method a
   Balance method.
   ii) Book value of the machine after 4th year and 6th year by Declining Balanc

OR

10 a. Explain with a block diagram the elements of cost and components of cost.
   b. 'Pizza corner" employed 75 workers in a particular month to work in the ou
   for home delivery. The following are the details of expenditure :
   i)   Cost of material = Rs 80,000/-
   ii)   Rate of wages for each workers = Rs 20 per hour of normal duty, Rs 40
         overtime duty.
   iii) Man hours per day of normal duty = 8 hours.
   iv)   Number of holidays per month (without wages) = 5 days.
   v)   Total overhead expenses = Rs 20,000/-.
   vi)   Total overtime availed by workers = 200 hours.
   vii) Profit = 20% of total cost.
   Determine i) Total cost for the month.

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

18CV51

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Construction Management and Entrepreneurship

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Discuss the ideal characteristics that a Management should exhibit. **(07 Marks)**
   b. Briefly explain the key steps involved in Construction planning. **(06 Marks)**
   c. What are the principles based on which organizational structure has to be framed? **(07 Marks)**

OR

2 a. What is Work break down structure? Mention its significance in Construction project. **(06 Marks)**
   b. Discuss suitability , advantages and disadvantages of Autocratic and Democratic style of Management **(06 Marks)**
   c. Draw the network diagram and identify critical path using CPM for the following activity data :

Activity	1-2	2-3	2-4	3-5	3-6	4-5	4-7	5-8	6-8	7-8
Duration (Days)	5	2	6	4	4	2	3	7	8	2

(08 Marks)

Module-2

3 a. What is the purpose of having material management system in construction? **(04 Marks)**
   b. Enumerate the factors to be considered for selection of construction equipments. **(07 Marks)**
   c. Explain different class of labour employed in construction project. **(09 Marks)**

OR

4 a. What are the factors influencing Inventory Management? **(05 Marks)**
   b. Estimate the hourly production of a Shovel with bucket capacity of $0.96m^3$ and cycle time of 30 seconds. Shovel is used to excavate hard soil in an open area. Excavated earth is to be loaded in waiting dump truck, positioned at 60^0. Equipment is utilized for 50 minutes in one hour. **(07 Marks)**
   c. List the factors affecting labour productivity. Briefly discuss any three factors. **(08 Marks)**

Module-3

5 a. Define Engineering Ethics. Mention the duties of Engineers, with respect to ethical practices. **(06 Marks)**
   b. Discuss the importance of Inspection in Construction. **(08 Marks)**
   c. Highlight the common causes of accident in Construction site. **(06 Marks)**

OR

6 a. Explain the safety measures to be adopted for excavation. **(06 Marks)**
   b. With reference to profession practice, discuss i) Conflict of Interest   ii) Gifts and Bribes. **(06 Marks)**
   c. Explain the concept of Total Quality Management. **(08 Marks)**

1 of 2

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-4

7 a. Define the following terms : i) Principal Amount   ii) Rate of Interest
iii) Interest Amount   iv) Interest Period. (04 Marks)
b. Discuss the principles of Engineering Economics. (06 Marks)
c. There are two alternatives for purchasing a concrete mixer and details are as follows. Choose best alternative using PW method @ 10% rate of interest. (10 Marks)

Parameter	Alternative - 1	Alternative - 2
Purchase cost (Rs)	3,00,000/-	2,00,000/-
Annual Operating and Maintenance cost (Rs)	20,000/-	35,000/-
Expected Salvage value (Rs)	1,25,000/-	70,000/-
Useful life (years)	05	05

OR

8 a. Briefly explain the concept of Minimum Cost Analysis. (06 Marks)
b. A Construction Company is planning to invest Rs 8,00,000/- for purchase of construction equipment with useful life of 10 years. Equipment is expected to generate net annual profit of Rs 1,40,000/- with expected salvage value of Rs 2,00,000/-. Compute the Rate of Return and comment on the investment if Company's MARR is 10%. (06 Marks)
c. Initial cost of an infrastructure project, expected to serve perpetually is Rs 1,50,00,000/-. Annual maintenance cost is Rs 8,00,000/- Renovation cost at end of every 15 years is Rs 18,00,000/-. Find the capitalized cost at an interest rate of 8% per year. (08 Marks)

Module-5

9 a. Enumerate services offered by TECSOK. (06 Marks)
b. Discuss the characteristics of MSME's. (06 Marks)
c. Explain different concept of Entrepreneurship. (08 Marks)

OR

10 a. List the benefits for investors and host country in Direct Foreign Investment. (04 Marks)
b. Briefly discuss challenges in International Entrepreneurship. (08 Marks)
c. What are the different sources of Finance for Entrepreneur? Explain. (08 Marks)

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN | | | | | | | | | |

18CV52

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Analysis of Indeterminate Structures

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 Analyze the continuous beam shown in Fig.Q1 by slope deflection method. Draw BMD, SFD and elastic curve.
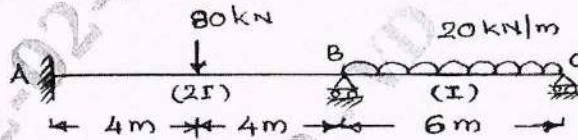

Fig.Q1

(20 Marks)

OR

2 Analyze the portal frame shown in Fig.Q2 by slope deflection method. Draw BMD and elastic curve.
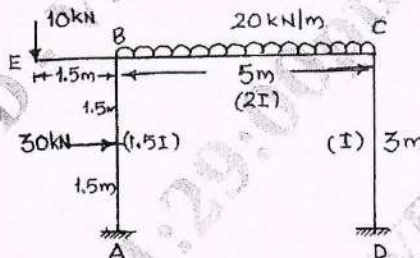

Fig.Q2

(20 Marks)

Module-2

3 Analyze the continuous beam shown in Fig.Q3 by using moment distribution method. Draw BMD SFD and elastic curve the support B sinks by 1 cm. Take $EI = 500$ kN-m^2.
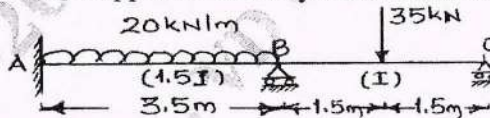

Fig.Q3

(20 Marks)

OR

4 Analyze the portal frame shown in Fig.Q4 by moment distribution method. Draw BMD, SFD and elastic curve.
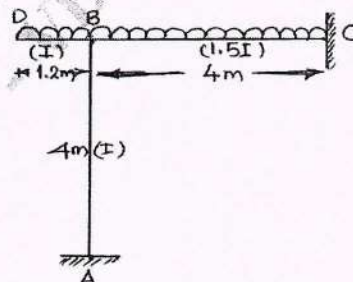

Fig.Q4

(20 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

5 Analyze the continuous beam shown in Fig.Q5 by using Kani's method. The support C sinks by 20 mm. Take $E = 200$ kN/mm^2, $I = 170 \times 10^6$ mm^4. Draw BMD, SFD and EC.
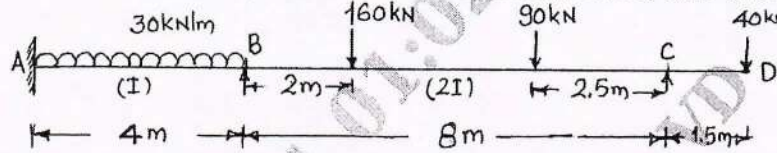

Fig.Q5   (20 Marks)

OR

6 Analyze the portal frame shown in Fig.Q6 by using Kani's method. Assume EI is constant throughout. Draw BMD and elastic curve.
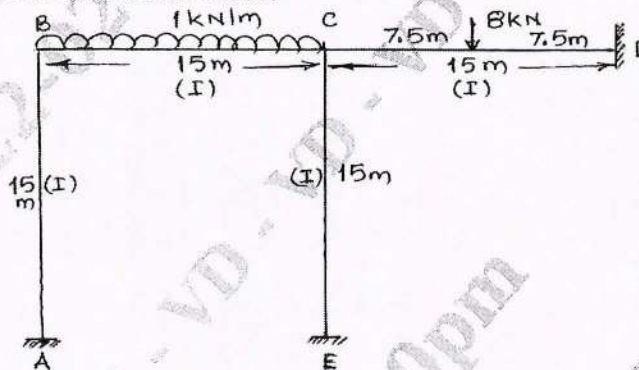

Fig.Q6   (20 Marks)

Module-4

7 Analyze the continuous beam by using flexibility matrix method. Draw BMD, SFD and elastic curve. Refer Fig.Q7.
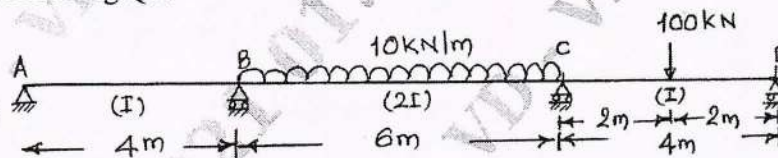

Fig.Q7   (20 Marks)

OR

8 Analyze the truss shown in Fig.Q8 by flexibility matrix method choosing force in the member AD as redundant. Assume constant EI for all the members.
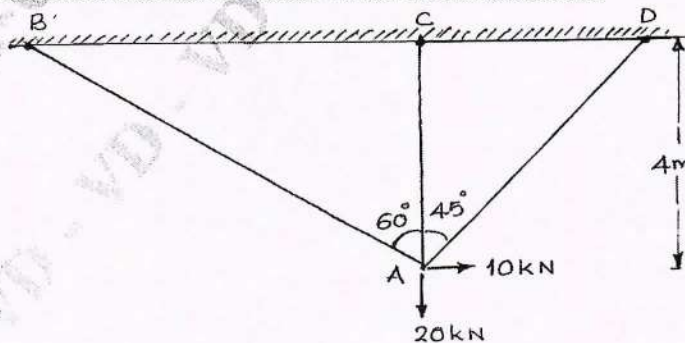

Fig.Q8   (20 Marks)

2 of 3

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-5

9 Analyze the continuous beam shown in Fig.Q9 by using stiffness matrix method. Draw BMD, SFD and elastic curve.

A diagram shows a continuous beam: 12 kN/m distributed load over span A-B (I), 4m. At B an upward support. 80 kN point load on span B-C (2I), located 2m from B, then 4m to C, total 6m.
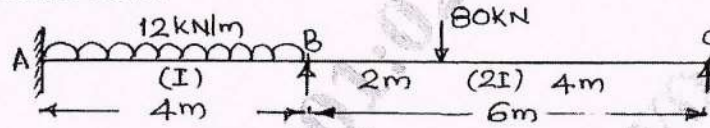
Fig.Q9

(20 Marks)

OR

10 Analyze the portal frame shown in Fig.Q10 by stiffness matrix method. Draw BMD and elastic curve.

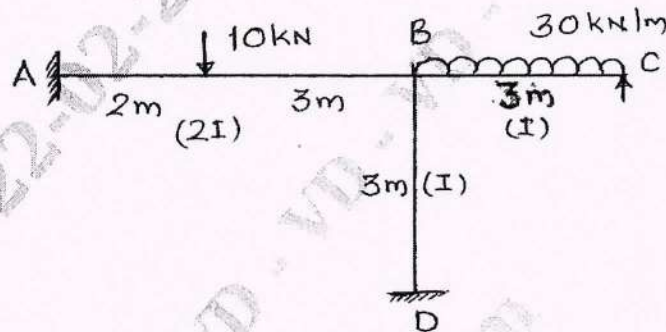A portal frame diagram: At A fixed support. 10 kN point load at 2m (2I), then 3m to B. From B to C: 30 kN/m over 3m (I). Column B-D: 3m (I), D fixed support.

Fig.Q10

(20 Marks)

* * * * *

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐   18CV53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Design of RC Structural Elements

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Use of IS : 456-2000, SP-16 is permitted.*
3. *Assume suitable additional data, if necessary.*

Module-1

1. a. Distinguish between working stresses and limit state methods design. **(08 Marks)**
   b. Write brief notes on :
   i) Balanced section
   ii) Under reinforced section
   iii) Deflection
   iv) Cracking. **(12 Marks)**

OR

2. a. Explain the factors that affect short and long term deflections. **(08 Marks)**
   b. A cantilever of 3.5m span is 300mm wide and 600mm deep. It is subjected to a maximum bending moment of 125kN-m due to uniformly distributed service loads of which 50% moment is due to permanent loads. The beam is reinforced with 4 bars of 20mm diameter at an effective cover of 50mm in the tension zone. Determine the immediate deflection. **(12 Marks)**

Module-2

3. a. An RC beam of rectangular section 300mm wide and overall depth of 850mm is reinforced with 4 bars of 25mm diameter on the tension side. Effective cover is 50mm. Find the ultimate moment of resistance of the section, if f_{ck} = 20N/mm^2 and f_y = 415N/mm^2. Find the additional reinforcement required to make this a balanced section. **(10 Marks)**
   b. Determine the moment of resistance of beam with the following data :
   b = 350mm, d = 900mm, d' = 50mm.
   Tension reinforcement: 5-20mm of Fe415 grade; compression reinforcement 2-20mm of the same grade. Grade of concert M20. **(10 Marks)**

OR

4. a. A T-Beam of flange width 850mm, flange thickness 100mm, rib width 275mm has an effective depth of 475mm. The beam is reinforcement with 4-20mm bars. Find the ultimate moment of resistance. Use M20 concrete and Fe415 steel. **(10 Marks)**
   b. Determine the shear capacity of the beam section with the following details:
   Size 230mm × 720mm effective depth reinforced with 5 number of 16mm diameter with 8mm diameter stirrups @300mm C/C. Use Fe 415 steel and M20 concrete. **(10 Marks)**

Module-3

5. Design a beam of effective span 6m to support a total working load of 12kN/m including the self weight of the beam. The width of the beam is limited to 250mm. Design for flexure and shears only, No need to curtail the bars. Use 16mm diameter main bars and 8mm diameter stirrups. Use M20 concrete and Fe415 steel. Show reinforcement details. **(20 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6   A T-Beam and slab floor system has a slab 125mm thick spanning between T-Beams. Which are spaced at 3.5m apart. The beams have a clear span of 8m and end bearings are 300mm walls. The live load on the floor is $4kN/m^2$ and floor finish is $0.6kN/m^2$. Take overall depth of the beam equal to 600mm and web width to 300mm. Take self weight of the slab and web as 13.90kN/m provide 20mm diameter main bars and 8mm diameter two legged stirrups. Use M20 concrete and Fe415 steel. Design the intermediate T-Beam for flexure and shear only.   **(20 Marks)**

Module-4

7   Design an RC slab for room measuring 4m × 5m is inside. The slab carries a live load of $2kN/m^2$ and is finished with 20mm topping of unit weight $24kN/m^3$. The slab is simply supported on all four edges with corners free to lift. No need to check for shear. Use M20 concrete and Fe415 steel.   **(20 Marks)**

OR

8   Design a dog legged stair for an office building in a room measuring 2.8m × 5.8m, clear vertical distance between the floors is 3.6m. The width of flight is to be 1.25m. Assume imposed load of $3kN/m^2$. Use M20 concrete and Fe415 grade steel. Assume that the stairs are supported on 230mm width support at the outer edges of landing slabs. Sketch the reinforcement details. Design of one flight is enough.   **(20 Marks)**

Module-5

9   a.   A reinforced concrete column of 2.75m unsupported length carries an axial load of 1600kN. Design a square column using M20 concrete and Fe415 steel. Assume both ends of the column as hinged.   **(10 Marks)**

    b.   Determine the reinforcement required for a short column for the following data :
Columns size : 300mm × 600mm, P_u = 1800kN ; M_{ux} = 110kN-m with respect to major axis. Use M25 concrete and Fe415 steel. Sketch reinforcement details. Assume 50mm effective cover.   **(10 Marks)**

OR

10   A square footing has to transfer a load of 1000kN from a square column of 400mm × 400mm. Assume M20 concrete and Fe415 steel, and SBC of soil $200kN/m^2$. Design the footing and sketch reinforcement details.   **(20 Marks)**

* * * * *

USN | | | | | | | | | | **18CV54**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Basic Geotechnical Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With the help of 3-phase diagram, explain (i) Void ratio (ii) Porosity (iii) Water content (iv) Degree of saturation. **(06 Marks)**

b. With usual notations, derive the relationship,
$$\gamma_d = \frac{(1-n_a)G.\gamma_w}{1+\omega G}$$
(06 Marks)

c. A fully saturated soil sample has a water content of 35% and specific gravity of 2.65. Determine its porosity, saturated unit weight and dry unit weight. If the w.c. is 15%, what will be the amount of water to be added for saturation? **(08 Marks)**

OR

2 a. Explain the Indian standard soil classification system. **(06 Marks)**

b. Define stoke's law. What are its assumptions and limitations? **(06 Marks)**

c. A liquid limit test on a clayey sample gave the following results. The plastic limit of the soil is 20%.

Number of blows	12	18	22	34
Water content, %	56	52	50	45

Plot flow curve and obtain:
(i) Liquid limit (ii) Flow Index (iii) Plasticity Index (iv) Toughness Index. **(08 Marks)**

Module-2

3 a. Briefly explain how water content, compactive effort and type of soil affect compaction. **(06 Marks)**

b. Distinguish between standard Proctor and Modified Proctor compaction tests. **(04 Marks)**

c. The following data was obtained from standard Proctor compaction test.

Water content, %	5.90	7.50	9.70	11.65	13.85
Weight of wet sample, N	18.20	19.50	20.10	20.00	19.70

G = 2.70, Volume of mould = 9.5×10^{-4} m^3. Plot the compaction curve and zero air voids line. Determine OMC and maximum dry density. **(10 Marks)**

OR

4 a. Explain with sketches the various soil structures. **(06 Marks)**

b. With sketch explain the three principal clay minerals. **(08 Marks)**

c. Explain electrical diffuse double layer and adsorbed water. **(06 Marks)**

Module-3

5 a. Derive the equations for average coefficient of permeabilities in vertical and horizontal directions. **(08 Marks)**

b. Explain with a neat sketch the method of locating the phreatic line in a homogeneous earth dam with horizontal filter. **(06 Marks)**

c. If during a variable head permeability test on a soil sample, equal time intervals are noted for drops of head from h_1 to h_2 and again from h_2 to h_3. Find the relationship between h_1, h_2 and h_3 **(06 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6 a. State the characteristics and uses of flownets. (06 Marks)
   b. Explain the terms superficial velocity and seepage velocity. Derive the relationship between them. (08 Marks)
   c. Compute the quantity of water seeping under a weir per day for which the flownet has been satisfactorily constructed. The coefficient of permeability is 2×10^{-2} mm/s. $n_f = 5$ and $n_d = 18$. The difference in water level between upstream and downstream is 3.0 m. The length of the weir is 60 m. (06 Marks)

Module-4

7 a. What are the advantages and disadvantages of direct shear test over triaxial test? (06 Marks)
   b. Explain sensitivity and thixotropy of clay. (06 Marks)
   c. The stresses on a failure plane in a drained test on a cohesionless soil are as under:
   Normal stress (σ) = 100 kN/m^2
   Shear stress (τ) = 40 kN/m^2
   Determine the angle of shearing resistance and the angle which the failure plane makes with the major principal plane. Also find the major and minor principal stresses. (08 Marks)

OR

8 a. Explain Mohr-Coulomb failure theory of soils. (06 Marks)
   b. Explain Vane shear test with a neat sketch. (06 Marks)
   c. A consolidated undrained test was conducted on a clay sample and the following results were obtained:-

Cell pressure (kN/m^2)	200	400	600
Deviator stress at failure, kN/m^2	118	240	352
Pore water pressure at failure, kN/m^2	110	220	320

   Determine the shear strength parameters with respect to,
   (i)   Total stresses.
   (ii) Effective stresses. (08 Marks)

Module-5

9 a. Explain spring analogy theory of consolidation of soil. (08 Marks)
   b. What is pre consolidation pressure? How is it determined by Casagraude's graphical method? (06 Marks)
   c. In a consolidation test, the void ratio of soil sample decreases from 1.20 to 1.10 when the pressure increases from 160 to 320 kN/m^2. Determine the coefficient of consolidation, if the coefficient of permeability is 8×10^{-7} mm/sec. (06 Marks)

OR

10 a. Explain square root of time fitting method. (06 Marks)
   b. A 20 m thick isotropic clay layer overlies an impervious rock. The coefficient of consolidation of soil is 5×10^{-2} mm^2/sec. Find the time required for 50% and 90% consolidation. Time factors are 0.2 and 0.85 for 50% and 90% consolidations respectively. (08 Marks)
   c. Explain pre consolidated, normally consolidated and under consolidated soil. (06 Marks)

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN ☐☐☐☐☐☐☐☐☐☐   **18CV55**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Municipal Wastewater Engineering

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the necessity of treating waste water. **(08 Marks)**
   b. Explain with a neat sketch, construction and working of a manhole. **(08 Marks)**
   c. Explain the principles of house drainage. **(04 Marks)**

OR

2 a. Define wet weather flow. Explain factors affecting wet weather flow. **(08 Marks)**
   b. The drainage area of one sector of a town 100 hectares having a population of one lakh persons, the rate of water supply is 150 LPCD, 80% of which flows out as sewage. The peak flow of sewage is 2.5 times the average flow. The area of the town is classified as follows:

Percentage of total area	Type of Surface	Run off coefficient
45	Hard pavements and roofs	0.85
20	Unpaved	0.45
20	Garden and lawn	0.25
15	Wooded area	0.15

   If time of concentration for the area is 30 minutes. Find the maximum run off. Use the following formula for intensity of Rainfall $R = \dfrac{900}{(t+60)}$. **(08 Marks)**
   c. What are traps? Explain the importance of traps. **(04 Marks)**

Module-2

3 a. Write the flow diagram employed to treat municipal waste water and indicate the importance of each treatment unit. **(08 Marks)**
   b. Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm diameter with sand particle of 1 mm diameter and specific gravity 2.66. Assume $\beta = 0.06$ and $f = 0.02$. Assume the sewer to run half full. Take N = 0.012. **(08 Marks)**
   c. What is sampling? Mention types of sampling. **(04 Marks)**

OR

4 a. Explain the concept of BOD and COD. Enumerate their limitation. **(08 Marks)**
   b. The BOD of a sewage incubated for one day at 30°C has been found to be 100 mg/l. What will be the 5 day 20°C BOD? Assume K = 0.12 (Base 10) at 20°C. **(08 Marks)**
   c. Briefly explain self cleansing velocity. **(04 Marks)**

Module-3

5 a. Discuss the importance of screening in waste water treatment operation and explain types of screens. **(08 Marks)**
   b. What do you understand by self purification of natural water bodies? Explain the factors affecting self purification. **(08 Marks)**
   c. Explain sewage farming. Mention the various methods of sewage farming. **(04 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6 a. With neat sketch, explain the different zones of self purification. **(08 Marks)**

b. A stream saturated with DO, has a flow of 1.2 m³/s, BOD of 4 mg/l and rate constant of 0.3 per day. It receives an effluent discharge of 0.25 m³/s having BOD 20 mg/l DO 5mg/l and rate constant 0.13 per day. The average velocity of flow of the stream is 0.18 m/s. Calculate the DO deficit at point 20 km downstream. Assume that the temperature is 20°C throughout and BOD is measured at 5 days. Take saturation DO at 20°C as 9.17 mg/l.

(08 Marks)

c. Draw a neat sketch of skimming tank. Enumerate importance of skimming tank. **(04 Marks)**

Module-4

7 a. Explain with neat sketch the working of Trickling Filter. What is the principle on which it working? **(08 Marks)**

b. Explain the different stages involved in the sludge digestion process. **(08 Marks)**

c. Briefly explain R.B.C. **(04 Marks)**

OR

8 a. Mention the various types of modification of ASP and explain any two methods in brief.

(08 Marks)

b. Design suitable dimensions of a circular trickling filter units for treating 5 million litres of sewage per day BOD of sewage is 150 mg/l. **(08 Marks)**

c. Write short note on drying beds. **(04 Marks)**

Module-5

9 a. Discuss in brief the Nitrification and Denitrification process in advance waste water treatment. **(08 Marks)**

b. Draw a neat sketch of septic tank. Write the design criteria required for septic tank.

(08 Marks)

c. Write a short note on advance oxidation process. **(04 Marks)**

OR

10 a. Discuss in brief the biological and chemical methods of removal of phosphorous from waste water. **(08 Marks)**

b. Write short notes on:
   (i) Electro coagulation
   (ii) Soak pits
   (iii) Eco toilets

(12 Marks)

* * * * *

USN

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Highway Engineering

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume the missing data, if any, as per IRC codes.*

Module-1

1 a. List the objectives and functions of the following in Highway development in India.
    i) Indian Roads congress
    ii) Central Road Research Institute.   **(06 Marks)**
  b. What is the contribution of KRDCL and KSHIP in the road development in Karnataka?
                                                                                            (08 Marks)
  c. List and elaborate the various advantages and disadvantages of Road transport compared with other modes of transport.   **(06 Marks)**

OR

2 a. Elaborate on various salient features of VISION 2021.   **(06 Marks)**
  b. What are the various factors affecting highway alignment? Explain each one, in detail with the help of neat sketches.   **(08 Marks)**
  c. What are the objectives of preliminary survey in highway Alignment? Enumerate the detail to be collected in it.   **(06 Marks)**

Module-2

3 a. Calculate the stopping sight distance on a highway for a vehicle moving at 80kmph on a
    i)   Level Road
    ii)   On a road having 1 in 100 grade (ascending and descending)
  Assume other data as per IRC recommendations.   **(08 Marks)**
  b. Explain PIEV theory with a neat sketch.   **(06 Marks)**
  c. What are the various factors affecting friction? Also explain skid and slip failures, in detail.
                                                                                            (06 Marks)

OR

4 a. Enumerate the steps for practical design of super elevation considering mixed traffic.
                                                                                            (06 Marks)
  b. Find the total width of pavement on a horizontal curve for a two lane National highway to be aligned along a rolling terrain with ruling minimum radius.   **(08 Marks)**
  c. List the various objects of providing a horizontal transition curve? Also explain the various shapes of transition curve and ideal transition curve.   **(06 Marks)**

Module-3

5 a. List and explain the various desirable properties of subgrade soil as highway material.
                                                                                            (06 Marks)
  b. List the various properties of coarse aggregate and the tests to be conducted to find each property of course aggregate.   **(06 Marks)**
  c. How do you find CBR value in the Laboratory? Explain the test procedure with a neat sketch.   **(08 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6 a. A plate load test was conducted on a soaked subgrade during monsoon season using a plate of diameter 30cm. The load values corresponding to the mean settlement dial readings are given below. Determine the modulus of subgrade reaction for the standard plate : **(08 Marks)**

Mean settlement value, in mm	0.0	0.26	0.52	0.76	1.02	1.26	1.53	1.76
Load values, in Kg	0.0	540	1010	1290	1510	1550	1730	1900

   b. What do you understand about HRB soil classification? Explain in detail? **(06 Marks)**
   c. Calculate the ESWL of a dual wheel assembly arraying 2044kg each for a trail pavement thickness values of 150, 200 and 250mm, if the centre to centre spacing between the two tyres = 270mm, clear gap between the wall of the tyres = 110mm **(06 Marks)**

Module-4

7 a. With a neat sketch, explain the method of determining the aggregate- bituminous mixes proportioning by Rothfuch's method. **(08 Marks)**
   b. List the explain the various construction steps in the WMM base construction. **(06 Marks)**
   c. What do you understand by Tack coat and Prime coat? List the various objectives of providing these in pavements. **(06 Marks)**

OR

8 a. Explain the various steps in the construction of Dense bituminous macadam pavement. **(10 Marks)**
   b. Step by step, explain in detail, construction of Dry Lean Concrete sub base course. **(10 Marks)**

Module-5

9 a. List the objects of
      i) Surface drainage
      ii) Sub surface drainage of roads. **(06 Marks)**
   b. What are various cross drainage structure? Explain each one of those. **(05 Marks)**
   c. What do you understand by
      i)   Lowering of water table
      ii) Control of seepage flow
      iii) Control of capillary rise.
   Explain with neat sketches. **(09 Marks)**

OR

10 a. Compare the annual costs of a 2 lane road for two types of pavement structures
      i) WBM with thin bituminous surface at a total cost of Rs 100 lakhs per km, life of 10 years, interest at 10%, with a salvage value of Rs 2.50 lakhs after 10 years, and annual average maintenance cost of Rs 5 lakhs/km
      ii) Bituminous macadam base and bituminous concrete surface, with a total cost of Rs 200 lakhs/km, life of 15 years, interest at a rate of 8%, salvage value of 3.50 lakhs at the end of 15 years, with annual average maintenance cost Rs 7.5 lakhs/km. Comment which one is more economical? **(08 Marks)**
   b. What is Public Private Partnership? How it will help the Road projects in India? Explain. **(06 Marks)**
   c. What are the various advantages and disadvantages of Benefit cost ratio method? Explain the method with formulae. **(06 Marks)**

* * * * *

USN | | | | | | | | | |

17CV/CT51

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Design of RC Structural Elements

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS 456-2000 and SP-16 is permitted.

Module-1

1 a. Explain balanced section, over reinforced section and under reinforced section. **(06 Marks)**
   b. Derive the expression for limiting steel and find limiting percentage steel for M20 concrete and Fe415 steel. **(06 Marks)**
   c. A doubly reinforced rectangular beam 250 × 550mm reinforced with 4-22mm diameter in tension 2-16mm diameter in compression E cover 50mm E span 12m Fe 415 steel. Check the deflection using modification factors. **(08 Marks)**

OR

2 a. Explain working stress method and limit state method of design. **(06 Marks)**
   b. Explain the philosophy of structural design. **(06 Marks)**
   c. Derive the expression for stress block parameters of compressive force C and its CG dist $\overline{Y}$. **(08 Marks)**

Module-2

3 a. A singly reinforced beam 250mm × 500mm is reinforced with 4-16mm diameter E-Cover 50mm E span 6m. Determine the central point load that can be applied at mid span adopt M20 concrete Fe 500 steel. **(10 Marks)**
   b. Find the steel for a rectangular section 300mm × 600mm to support a load of 80kN/m E-span 6m E-Cover 50mm adopt M20 concrete Fe 415 steel. **(10 Marks)**

OR

4 a. A doubly reinforced concrete beam 250 × 450mm is reinforced with 4-20mm diameter in comp 6-20mm diameter in tension. Find ultimate moment take E cover 50mm adopt M20 concrete Fe415 steel. **(10 Marks)**
   b. A T beam has a flange width 1200mm flange thickness 100mm E depth 600mm web 300mm. Find steel to support ultimate moment 700kN m adopt M20 concrete Fe510 steel. **(10 Marks)**

Module-3

5 Design a beam having clear span 5m supporting a love load 10kN/m for flexure and shear. Apply the check for deflection and bond. Adopt M20 concrete Fe415 steel. **(20 Marks)**

OR

6 A rectangular beam 250mm × 500mm to support a load 40kN/m including self wt (working load) E-span 5m E-cover 50mm. Design the beam for flexure and shear and apply check for deflection and bond. **(20 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-4

7   Design a two way slab for a room 6m × 4m wall thickness 230mm. All edges discontinuous and corners are held down live load $4kN/m^2$ floor finish $1kN/m^2$ thickness of slab 150mm adopt M20 concrete Fe415 steel. **(20 Marks)**

OR

8   An open well stair case is to be provided for a stair hall 3.25m × 3.25m. The size of open well at centre 1.25m × 1.25m Floor height 3.6m size of landing at each corner is 1m × 1m thickness of stair wall 230mm. The stair slab is embedded into wall by 200mm live load $3kN/m^2$ design the stair. **(20 Marks)**

Module-5

9   a. An axially loaded RCC column un supported length 2.75m has to carry an axial load 2000kN design a square section column. **(12 Marks)**

    b. Design a column using SP-16 having a section 300mm × 400mm subjected to ultimate load 1200kN ultimate moment M_u = 200kN m. Take effective cover 50mm. Assume steel on two sides only. **(08 Marks)**

OR

10 A square column 400mm sides carries a load of 900kN. Design footing SBC of soil $100kN/m^2$ adopt M20 concrete Fe415 steel. Apply the check for one way shear and two way shear and bond. Assume depth of edges 300mm (Isolated footings). **(20 Marks)**

* * * * *

USN ☐☐☐☐☐☐☐☐☐☐

17CV52

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Analysis of Indeterminate Structures
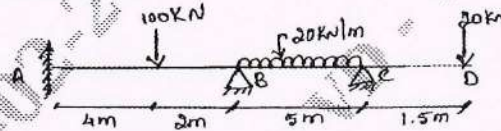
Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   Analyze continuous beam shown in Fig. Q1, by Slope deflection method. Draw Bending Moment diagram. Take EI constant. **(20 Marks)**
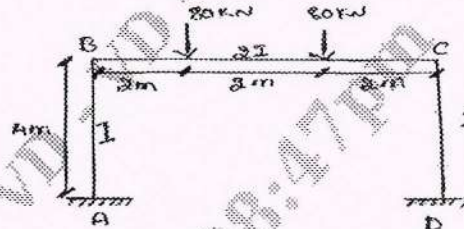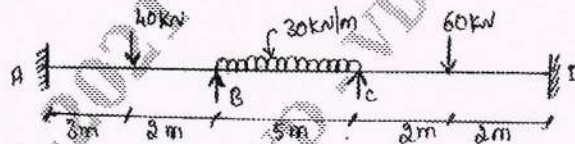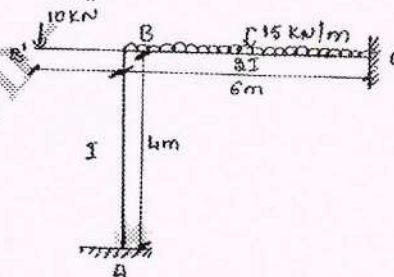
Fig. Q1

OR

2   Analyze the Portal frame shown in Fig. Q2, by Slope Deflection method. Draw bending moment diagram. **(20 Marks)**

Fig. Q2

Module-2

3   Analyze Continuous beam shown in Fig. Q3, by Moment Distribution method. Draw Bending Moment diagram. Take EI constant. **(20 Marks)**

Fig. Q3

OR

4   Analyze Portal frame shown in Fig. Q4, by Moment Distribution method. Draw Bending Moment diagram. **(20 Marks)**

Fig. Q4

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-3

5   Analyze the Continuous beam shown in Fig. Q5, by Kani's method. Draw Bending Moment diagram.   (20 Marks)

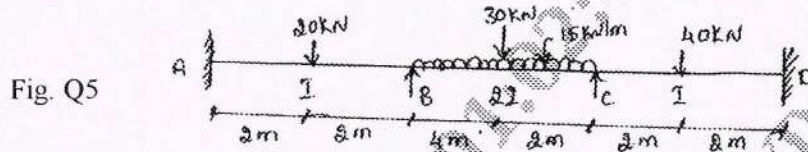Fig. Q5

OR

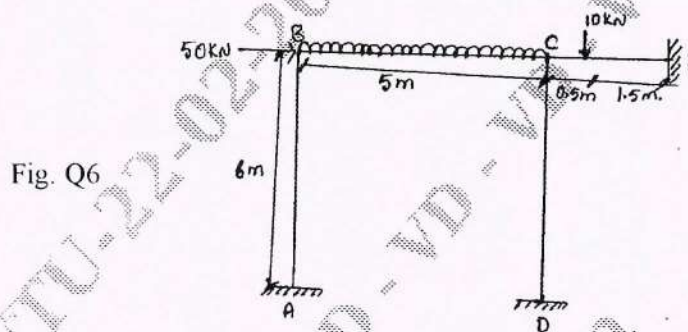6   Analyze the frame shown in Fig. Q6, by Kani's method. Draw Bending Moment diagram.   (20 Marks)

Fig. Q6

Module-4

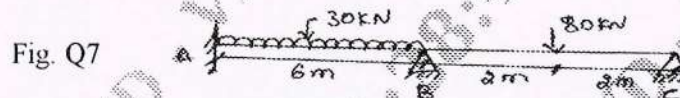7   Analyze the beam shown in Fig. Q7, by Flexibility Matrix method. Draw Bending Moment diagram.   (20 Marks)

Fig. Q7

OR

8   Analyze Portal frame shown in Fig. Q8, by Flexibility Matrix method. Draw Bending Moment diagram.   (20 Marks)
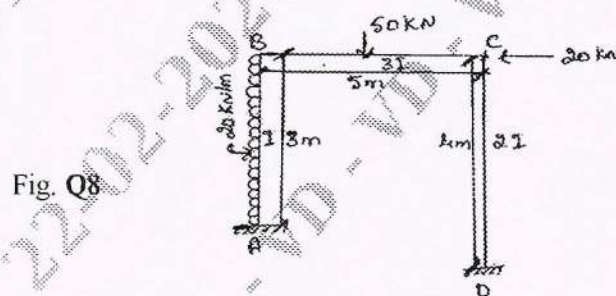
Fig. Q8

Module-5

9   Analyze the beam shown in Fig. Q9, by Stiffness Matrix method. Draw Bending Moment diagram.   (20 Marks)
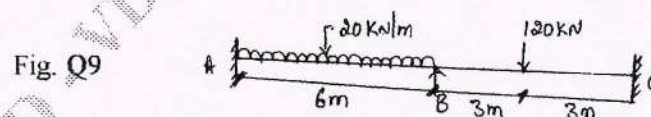
Fig. Q9

OR

10 Analyze Portal frame shown in Fig. Q10, by Stiffness Matrix method. Draw Bending Moment diagram. **(20 Marks)**
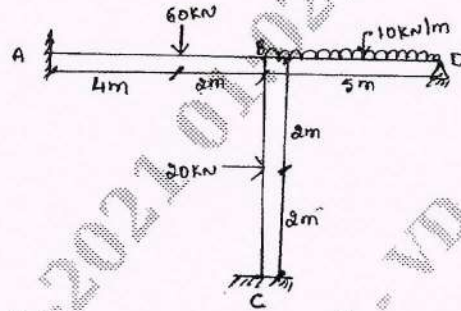

Fig. Q10

* * * * *

3 of 3

USN ☐☐☐☐☐☐☐☐☐☐ 17CV53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Applied Geotechnical Engineering

Time: 3 hrs.   Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
       2. Use of IS:6403 permitted.

Module-1

1   a.   Enumerate the objectives of soil investigation.   **(06 Marks)**
    b.   Explain the wash boring method of soil exploration with a neat sketch.   **(07 Marks)**
    c.   With a neat sketch of soil sampler, define:
      i) Area ratio   ii) Inside clearance   iii) Outside clearance   iv) Recovery ratio. **(07 Marks)**

OR

2   a.   Distinguish between disturbed, undisturbed and representative samples, for which type of test the samples are suited.   **(06 Marks)**
    b.   What is meant by drainage and dewatering? Explain electro-osmosis method of dewatering.   **(07 Marks)**
    c.   Explain the Hvorslev's method of locating the ground water table.   **(07 Marks)**

Module-2

3   a.   Distinguish between Bousinessq and Westergaard's theory of stress distribution.   **(06 Marks)**
    b.   Explain equivalent point load method of determining vertical stress at a point within loaded area.   **(07 Marks)**
    c.   A load of 1000kN acts as a point load at the ground surface. Estimate the stress at a point 2m below and 4m away from the point of action of the load by Bousinenq's formula. Compare with Westergaard's formula.   **(07 Marks)**

OR

4   a.   A concentrated load 1000kN acts at the ground surface. Construct a 25% isobar.   **(06 Marks)**
    b.   Explain the construction and use of Newmark's chart.   **(07 Marks)**
    c.   A saturated clay 8m thick underlies a proposed new building. The existing overburden pressure at the centre of clay layer is 300kPa and load due to the new building increases the pressure by 200kPa. The liquid limit of the soil is 75%, water content – 50% and G = 2.7. Estimate the consolidation settlement.   **(07 Marks)**

Module-3

5   a.   Distinguish between active and passive earth pressure. What are the assumptions made in the Rankine's earth pressure theory?   **(06 Marks)**
    b.   Explain the Culmann's graphical method of determining the active Earth pressure. **(07 Marks)**
    c.   A Smooth vertical wall of height 4.5m retains a cohesion less backfill with $\phi = 30°$, void ratio = 0.62 and G = 2.7. If the soil is completely dry, draw the earth pressure distribution on the wall. If the water table rises to the top of the soil, compute the total earth pressure on the wall.   **(07 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6 a. Explain the causes for a slope failure. Explain with neat sketch the different modes of slope failure. **(06 Marks)**

b. Explain the method of slices for slope stability analysis. **(07 Marks)**

c. Calculate the factor of safety with respect to cohesion of clay, the slope laid at 1 in 2 to a length of 11m. If the angle of internal friction $\phi = 10°$, Taylor's stability number is 0.064, $c = 20kN/m^2$ and $\gamma = 19kN/m^2$. Determine the critical height of the slope. Determine the critical height of the slope in this soil. **(07 Marks)**

Module-4

7 a. What are the assumptions made in Terzaghi's theory? Write the expression for ultimate bearing capacity of strip footing, square and circular footing. **(10 Marks)**

b. The footing of a column $2.5 \times 2.5m$ is founded at a depth of 1.5m on a cohesive soil of unit weight $18kN/m^3$. Take $C = 30kN/m^2$, $\phi = 0$. What is the safe load for this footing? **(10 Marks)**

OR

8 a. With the help of neat sketch, explain the effect of water table on the bearing capacity of soil. **(10 Marks)**

b. Explain standard penetration test with suitable corrections. How do you access b.c. of shallow footings on sand using SPT test data? **(10 Marks)**

Module-5

9 a. List and explain the classification of piles based on function and material. **(10 Marks)**

b. A square pile group of 9 piles of 250mm diameter is arranged with a pile spacing of 1m. The length of the pile is 9m. The unit cohesion of clay is $75kN/m^2$. Neglecting bearing at the tip of the piles. Determine the group capacity. Assume adhesion factor of 0.75ϕ. **(10 Marks)**

OR

10 a. Write a note on negative skin friction. **(10 Marks)**

b. Write a note on under-reamed piles. How can the ultimate load carrying capacity of under-reamed piles can be estimated. **(10 Marks)**

* * * * *

2 of 2

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN ☐☐☐☐☐☐☐☐☐☐

Fifth Semester B.E. Degree Examination, Jan./Feb.2021
Masonry Structures

Time: 3 hrs.   Max. Marks: 100

Note:1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Use of IS-1905-1987 code of practice for structural use of un reinforced masonry' is permitted.*
3. *Draw self explanatory sketches wherever necessary.*

Module-1

1 a. Explain the field tests and laboratory tests (compression, water absorption, modulus of elasticity, efflorescence) conducted on good building bricks. **(07 Marks)**

   b. Explain with neat sketches various types of cracks in masonry and suggest remedial measures. **(07 Marks)**

   c. What are the factors affecting compressive strength of masonry? **(06 Marks)**

OR

2 a. Explain briefly quality of good building stones. **(06 Marks)**

   b. Explain various defects and errors in masonry. **(07 Marks)**

   c. Derive the expression for compressive strength of masonry based on elastic theory. **(07 Marks)**

Module-2

3 a. With neat sketches, explain any five type of walls. Discuss effective thickness of such walls. **(06 Marks)**

   b. Explain the following design criteria for different type of walls and end conditions :
   (i) Effective thickness   (ii) Effective height **(07 Marks)**

   c. A solid wall with piers have following details:
   Thickness of wall t_w = 200 mm
   Centre to Centre distance of piers = 3600 mm
   Width of piers (W_p) = 200 mm
   Thickness of piers (t_p) = 400 mm
   Length of wall = 7200 mm
   No openings in the wall and is supported by cross walls at each end.
   Height of wall = 3300 mm
   The wall is fully restrained at top and bottom equivalent eccentricity $(\bar{e})$ = 11.7 mm
   Determine : (i) Effective thickness of wall
   (ii) Effective length of wall
   (iii) Effective height of wall
   (iv) Slenderness ratio
   (v) Stress reduction factor **(07 Marks)**

OR

4 a. Explain the importance of following criteria in the design of masonry structure:
   (i) Permissible compressive stress,
   (ii) Stress reduction factor,
   (iii) Area reduction factor,
   (iv) Shape modification factor,
   (v) Increase in permissible compressive stress for eccentric loading.
   (vi) Permissible tensile stress. **(10 Marks)**

1 of 3

b. A cavity wall consists of two leaves 100 mm thick and is separated by a cavity of 50 mm in between. The length of the wall is 5.0 m without any openings. The height of the wall is 3.0 m and the wall is fully restrained at the bottom and partially restrained at the top. It carries an eccentric load whose equivalent eccentricity (e) = 8.8. Determine
- (i) Effective thickness
- (ii) Effective height
- (iii) Effective length
- (iv) Slenderness ratio
- (v) Stress reduction factor   **(10 Marks)**

Module-3

5 a. Explain the design criterion of walls subjected to uniformly distributed load.   **(04 Marks)**

b. Design an interior cross-wall of a two storeyed building to carry 150 mm thick RCC slabs with 3 m ceiling height. The wall is fully restrained at top and bottom. It supports a 3.0 m wide slab.

Live load on roof = 2 kN/m^2
Live load on floor = 2.5 kN/m^2
Weight of 80 mm thick terrace = 1.96 kN/m^2
Weight of floor finish = 0.8 kN/m^2
Refer Fig. Q5 (b).
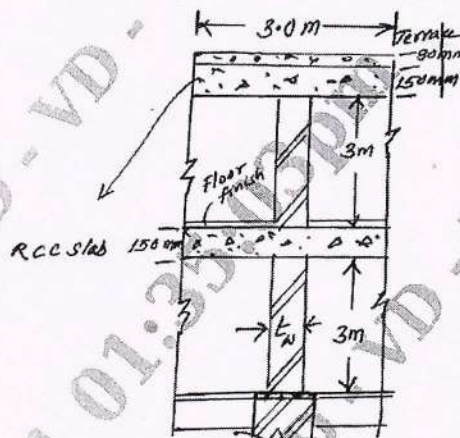

Fig. Q5 (b)   **(16 Marks)**

OR

6 a. Explain the procedure of design of walls with openings.   **(04 Marks)**

b. Design an interior cavity wall for three storeyed building the ceiling height of each storey being 3.0 m. The wall is stiffened by intersecting walls 200 mm thick at 3600 mm centre to centre. Both top and bottom of wall are fully restraint.
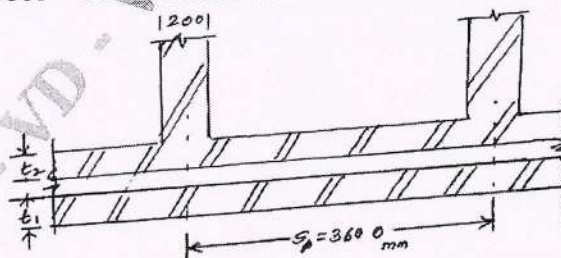Assume loading from roof = 16 kN/m and from each floor = 12.5 kN/m. Refer Fig. Q6 (b).

Fig. Q6 (b)   **(16 Marks)**

Module-4

7 a. Draw the stress distribution diagrams under eccentric loads for the following conditions:

   (i) Eccentricity $e = 0$ (ii) $0 < e < \dfrac{t}{6}$ (iii) $e = \dfrac{t}{6}$ (iv) $e > \dfrac{t}{6}$ **(06 Marks)**

   b. Design an exterior wall with piers under a concentrated load for a workshop building 3.6 m high carrying steel trusses at the top at 4.5 m spacing. The wall is securely tied at the roof and floor levels. The loading is as follows:
   - (i)   Concentrated reaction from the roof truss = 30 kN acting at the centre of wall.
   - (ii)   Roof loading = 7 kN/m
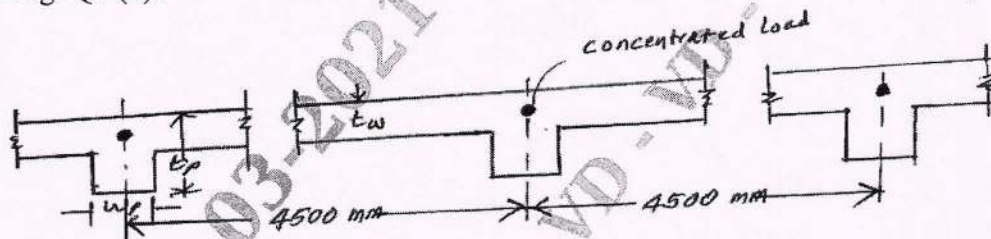   - (iii) Neglect wind load

   Refer Fig. Q7 (b).   **(14 Marks)**

Fig. Q7 (b)

OR

8 a. Explain the design criteria of walls subjected to concentrated axial loads.   **(05 Marks)**

   b. Design an external cavity wall of a single storeyed building the inner leaf of which supports an eccentric load of 10 kN/m at an eccentricity of 25 mm. The wall is fully restrained at top and bottom and supports a concrete roof at the top. Height of wall is equal to 4.0 m. Refer Fig. Q8 (b).   **(15 Marks)**
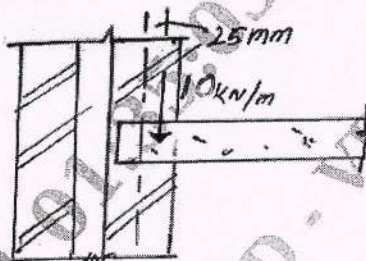

Fig. Q8 (b)

Module-5

9 a. With neat sketches indicating forces acting, explain the stability checks on a retaining wall.   **(06 Marks)**

   b. Design a shear wall 5.0 m long and 3 m high to resist a horizontal earth quake force in its plane. Assume the seismic load to be uniformly distributed across the height of wall. Earthquake acceleration = 0.1 g. The wall is tied with metal anchors at the top and bottom supports.   **(14 Marks)**

OR

10 a. With neat sketches, explain different modes of failure of in-filled frames.   **(06 Marks)**

    b. Design a compound wall the height of which is 1.8 m from ground level to the top of coping. Assume wind pressure is equal to 1000 N/mm^2 and is uniformly distributed. The safe bearing pressure on the soil is 120 kN/m^2. Assume foundation suitably.   **(14 Marks)**

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN ☐☐☐☐☐☐☐☐☐☐

17CV/CT563

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Remote Sensing and GIS

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Write neat sketches wherever necessary.*

Module-1

1 a. Define Remote Sensing. Explain the elements involved in Remote Sensing with neat sketch.
                                                                                (10 Marks)
   b. What is Spectral reflectance curve? Explain the different types of spectral reflectance curve with neat sketch.   **(10 Marks)**

OR

2 a. What is electromagnetic spectrum? Explain the Electromagnetic Spectrum with neat sketch.
                                                                                (10 Marks)
   b. What is visual interpretation? Explain tools used in visual interpretation.   **(10 Marks)**

Module-2

3 a. What is Resolution? Describe all sensor Resolution.   **(10 Marks)**
   b. What is Platform in remote sensing? Explain different types.   **(10 Marks)**

OR

4 a. Explain Systematic errors.   **(08 Marks)**
   b. Explain Indian Remote Sensing satellite.   **(12 Marks)**

Module-3

5 a. Define GIS. Describe key components and function of GIS.   **(10 Marks)**
   b. Describe different data types used in GIS.   **(10 Marks)**

OR

6 a. What is map projection? Explain the types of map projection.   **(10 Marks)**
   b. Write a note on spectral data input and Attribute data management.   **(10 Marks)**

Module-4

7 a. What is vector data? Explain vector data model.   **(10 Marks)**
   b. Write a note on : i) Coverage ii) Shape file   iii) Data base management system. **(10 Marks)**

OR

8 a. What is Raster data? Explain raster data model and types.   **(10 Marks)**
   b. Explain different raster data structure.   **(10 Marks)**

Module-5

9 a. Explain the following : i) Land use land cover analysis ii) Change detection. **(10 Marks)**
   b. Explain the application of RS and GIS in natural resources management.   **(10 Marks)**

OR

10 a. Explain following ; i) Water Resource   ii) Urban planning.   **(10 Marks)**
    b. Explain the application of location based service.   **(10 Marks)**

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN ☐☐☐☐☐☐☐☐☐☐   **15CV51**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Design of RC Structural Elements

Time: 3 hrs.   Max. Marks: 80

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
       2. *Use of IS – 456 ,SP16 chart permitted.*
       3. *Assume missing data suitably.*

<div style="writing-mode: vertical-rl">Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.</div>

Module-1

1   a.   What is Limit state? Explain different limit states to be considered in the design of RC beams.   **(06 Marks)**
    b.   Explain the terms Singly Reinforced and Doubly Reinforced, with neat sketch.   **(04 Marks)**
    c.   What is Stress block? Derive from fundamentals for the area of stress block $0.36f_{ck}$ b x_u and depth of concrete of compressive force from the extreme fibre in compression $0.42 x_u$.   **(06 Marks)**

OR

2   a.   Briefly explain under reinforced , over reinforced and balanced with neat sketch.   **(08 Marks)**
    b.   A flanged beam of T – section is simply supported over an effective span of 8m. The beam has effective flange width of 1400mm , thickness of flange as 150mm , breadth of web as 300mm and effective depth of 450mm. It is reinforced with 4 bars of 25mm diameter in tension and 3 bars of 16mm diameter in compression. Check the beam for deflection. Use M20 and Fe 415 sheets.   **(08 Marks)**

Module-2

3   a.   A RCC beam of section 330mm × 500mm is reinforced with 3 – bars of 20mm diameter with an effective cover 50mm. The beam is simply supported over a span of 5m. Find maximum permissible UDL on the beam. Use M20 grade concrete and Fe 500 steel.   **(08 Marks)**
    b.   Design a rectangular beam for an effective span of 6m. The superimposed load is 80kN/m and size of the beam is limited to 300mm × 700mm overall with an effective cover 50mm.Use M20 mix and Fe 415 grade steel.   **(08 Marks)**

OR

4   a.   A RC T – beam having total depth 380mm and width 230mm is cast monolithically with slab 110mm thick. The beam is simply supported over a span of 4.44m and spaced 3m c/c. Concrete mix M20 and steel of grade Fe 500 have been used. Calculate the maximum UDL. The beam can carry and the corresponding steel.   **(10 Marks)**
    b.   A RC beam 230mm wide and 450mm deep is reinforced with 3nos of #16mm bars of grade Fe415, on the tension side, with an effective cover of 50mm. Ultimate design shear force is 80kN. Design the shear reinforcement.   **(06 Marks)**

Module-3

5   A rectangular beam is to be simply supported on supports of 300mm width. The clear span of the beam is 6m. The beam is to have width of 230mm. The characteristic superimposed load is 12kN/m. Using M_{20} and Fe500 steel, design the beam and sketch details of reinforcement.   **(16 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6 Design a rectangular beam of section 300mm and 500mm over all. Effective span 6m and effective cover for reinforcement should be kept as 50mm. Superimposed load on the beam is 40kN/m. Use M_{20} concrete and Fe415 steel. Sketch details of reinforcement. **(16 Marks)**

Module-4

7 a. Distinguish between one way slab and two way slab. **(04 Marks)**
   b. Design a continuous R.C. slab for a class room 7 in wide and 17.5m long. The roof is to be supported on RCC beams spaced at 3.5m intervals. The width should be kept 300mm. The super imposed load is $3kN/m^2$ and finishing load is $1kN/m^2$. Use M_{20} concrete and Fe 500 steel. Show reinforcement details. **(12 Marks)**

OR

8 a. Design a R.C slab for a room measuring 6.5m × 5.0m. The slabs is to be cast monolithically over the beams with corners held down. The width of the supporting beam is 230mm. The slab carries superimposed load of $5kN/m^2$. Use M_{20} grade concrete and steel grade Fe500. Sketch details of reinforcement. **(08 Marks)**
   b. Design a dog – legged stair for a building in which the vertical distance between floor is 3.6m. The stair hall measures 2.5m × 5.0m. the live load may be taken as $2.5kN/m^2$. Use M_{20} concrete and Fe 415 steel bars. **(08 Marks)**

Module-5

9 a. Explain the following : i) Pedestal   ii) Short column   iii) Long column. **(03 Marks)**
   b. What are the assumptions made in the limit state of Collapse – compression? **(04 Marks)**
   c. Design the reinforcement for a short axially load square column of size 450mm × 450mm to support a load of 1500kN and Fe500 steel. **(09 Marks)**

OR

10 A rectangular column 400mm × 600mm carries and live load of 2kN. The SBC of soil is $150kN/m^2$. Using M_{20} concrete and Fe415 steel. Design a rectangular footing to support the column. Sketch the details of reinforcement. **(16 Marks)**

* * * * *

USN | | | | | | | | | | **15CV52**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Analysis of Indeterminate Structures

Time: 3 hrs.   Max. Marks: 80

*Note: **1.** Answer any FIVE full questions, choosing ONE full question from each module.*
*   **2.** Assume missing data suitably.*

Module-1

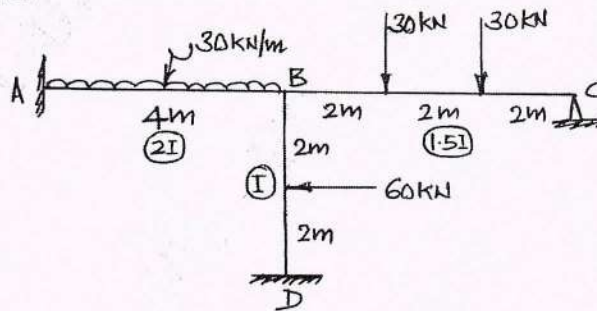1   Analyze the frame shown in Fig.Q1. Using slope deflection method. Also draw BMD and sketch the elastic curve.

Fig.Q1   (16 Marks)

OR

2   Analyze the frame shown in Fig.Q2. Using slope deflection method. Also draw BMD and sketch the elastic curve.

Fig.Q2   (16 Marks)

Module-2

3   Analyze the frame shown in Fig.Q3 by the method of Moment Distribution. Draw BMD, SFD and also sketch the elastic curve.

Fig.Q3   (16 Marks)

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

4 Analyze the continuous beam shown in Fig.Q4 by the method of moment distribution. Draw BMD, SFD and also sketch the elastic curve.

Fig.Q4   **(16 Marks)**

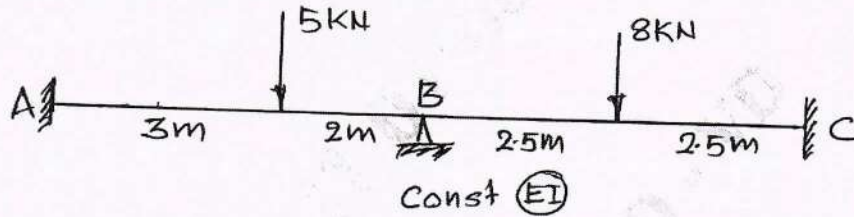## Module-3

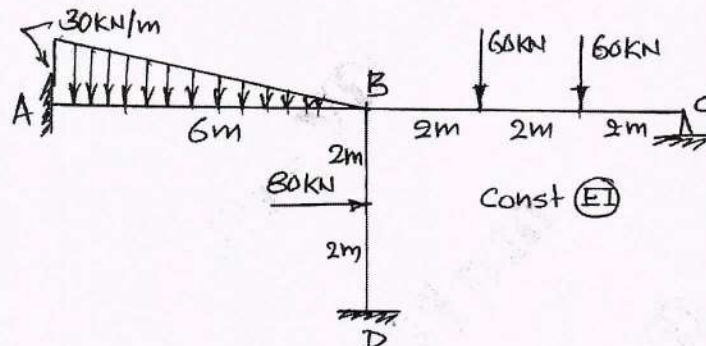5 Analyze the frame shown in Fig.Q5 by using Kani's method. Draw BMD and also sketch the elastic curve.

Fig.Q5   **(16 Marks)**

OR

6 Determine the support moments for the continuous beam shown in Fig.Q6 by Kani's method. The relative I values are indicated along the member in each span. E is constant. Draw BMD and elastic curve.
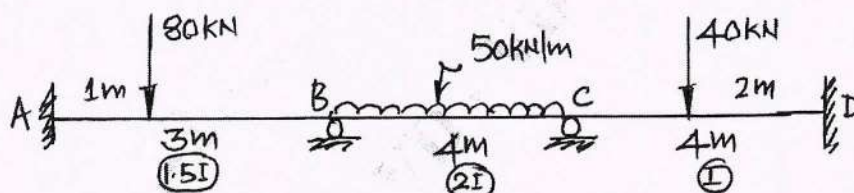

Fig.Q6   **(16 Marks)**

Module-4

7 Analyze the continuous beam shown in Fig.Q7 by flexibility matrix method. Take EI constant throughout. Draw BMD.

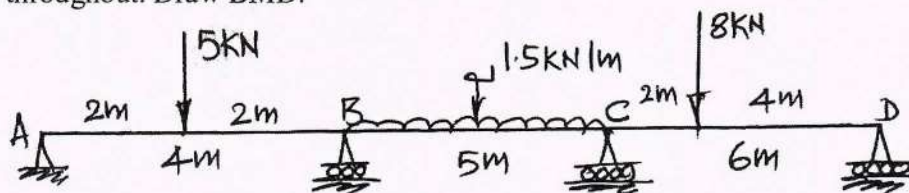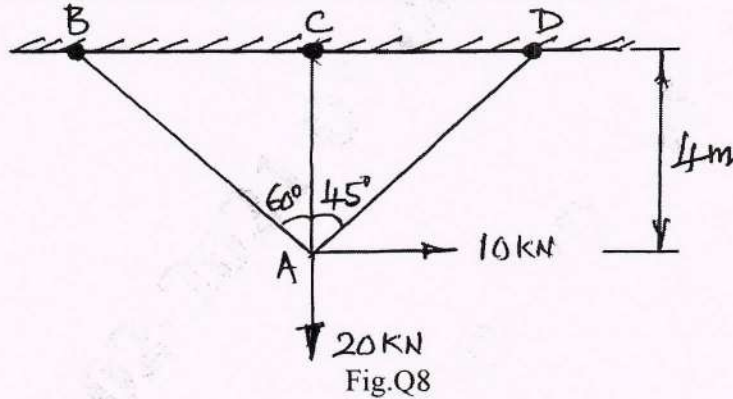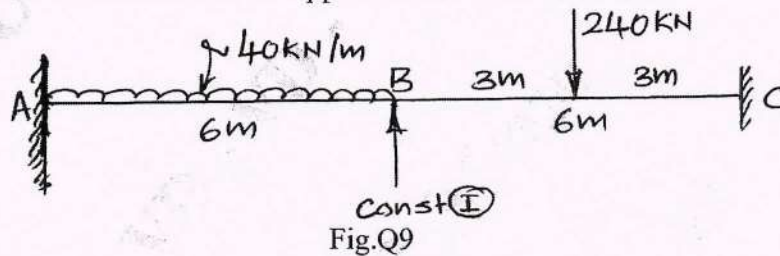Fig.Q7   **(16 Marks)**

OR

8 Analyze the truss shown in Fig.Q8 by flexibility matrix method. Choosing the force in member AD as redundant. Assume AE as constant for all members.
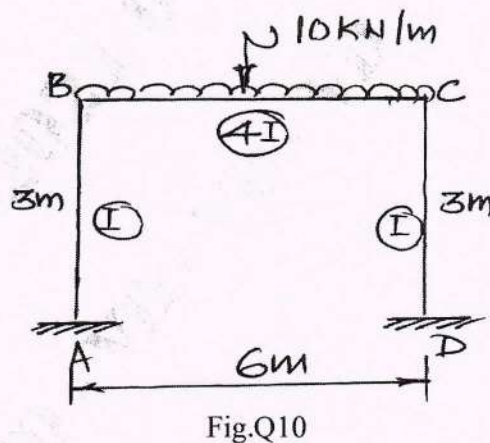

Fig.Q8   (16 Marks)

Module-5

9 Analyze the continuous beam shown in Fig.Q9 by stiffness method, using system approach. Draw BMD, SFD and elastic curve. Supports A and C are fixed ends.

Fig.Q9   (16 Marks)

OR

10 Analyze the rigid jointed plane frame shown in Fig.Q10 by stiffness matrix method. Draw BMD.

Fig.Q10   (16 Marks)

* * * * *

3 of 3

USN | | | | | | | | | | **15CV53**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Applied Geotechnical Engineering

Time: 3 hrs.   Max. Marks: 80

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. Missing data, if any, may be suitably assumed.

Module-1

1   a.   List the methods of soil exploration. With a neat sketch explain seismic refraction method. **(08 Marks)**

     b.   A sampling tube has inner diameters of 70mm and cutting edge diameter of 68mm. Its outside diameter are 72mm and 74mm respectively. Determine the area ratio, inside clearance and outside clearance of the sampler. This tube is pushed at the bottom of the borehole to a distance of 550mm with length of sample recorded being 530mm. Find recovery ratio. **(08 Marks)**

OR

2   a.   List the methods of dewatering employed in field and with a neat sketch explain multi-stage well point system. **(08 Marks)**

     b.   Estimate the position of the ground water table from the following data obtained from the field :
       i)   Depth upto which water is bailed out   = 30m
       ii)   Raise is water level on First day   = 2.2m
       iii)   Raise in water level on Second day   = 1.8m
       iv)   Raise is water level on Third day   = 1.5m. **(08 Marks)**

Module-2

3   a.   Compare Bousinesq's and Westergaard's analysis. Also state their limitations. **(08 Marks)**

     b.   Find the intensity of vertical pressure and horizontal shear stress at a point 4m directly below a 20kN point load acting at a horizontal ground surface. What will be the vertical pressure and shear stress at a point 2m horizontally away from the axis of loading but at the same depth of 4m? **(08 Marks)**

OR

4   a.   Explain the terms immediate settlement, consolidation settlement, secondary settlement differential settlement and uniform settlement. **(10 Marks)**

     b.   Estimate the immediate settlement of a footing of size 2m × 3m resting at a depth of 2m is a sandy soil whose compression modulus is $10N/mm^2$ and the footing is expected to transmit a unit pressure of 160 kN/m^2. Assume $\mu = 0.28$ and $I_f = 1.06$. **(06 Marks)**

Module-3

5   a.   With neat sketches explain types of earth pressure. **(08 Marks)**

     b.   A retaining wall of 8m height retains sandy material. The properties of sand are $e = 0.6$, $\phi = 30°$ and $G = 2.65$. The water table is at a depth of 2.5m from the ground surface. Draw the earth pressure diagram and determine the intensity of earth pressure at the base of the retaining wall. **(08 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6   a.   List causes of slope failure and with neat sketches explain types of slope failures.   **(08 Marks)**
    b.   A 5m deep canal has side slopes of 1 : 1. The properties of soil are $C_u = 20kN/m^2$, $Q_u = 10°$, $e = 0.8$, and $G = 2.8$. If Taylor's stability number is 0.108 determine the factor of safety with respect to cohesion when the canal runs full. Also find the same in case of draw down, if the stability numbers for this condition is 0.137.   **(08 Marks)**

Module-4

7   a.   With a neat sketch explain standard penetration test.   **(08 Marks)**
    b.   Determine the safe bearing capacity of square footing 2.1 width placed at a depth of 1.5m in a soil with saturated unit weight of 17 kN/m^3, $C = 15$ kN/m^2, $\phi = 20°$, $N_C = 11.8$, $N_q = 3.9$ and $N_r = 1.7$. What is the change in bearing capacity, if the water table raises to 0.5m above the base of the footing? Assume factor of safety as 3. (Take unit weight of soil as $17kN/m^3$ for all cases).   **(08 Marks)**

OR

8   a.   With neat sketches explain types of shallow foundations.   **(10 Marks)**
    b.   A square footing located at a depth of 1.3m below ground has to carry a safe load of 800kN. Find the size of footing if the desired factor of safety is 3. Use Terzagh's analysis for general shear failure. Take $C = 8$ KPa, $N_c = 37.2$, $N_q = 22.5$ and $N_r = 19.7$.   **(06 Marks)**

Module-5

9   a.   Explain the classification of piles based on load transfer and function.   **(08 Marks)**
    b.   In a 16 pile group, the pile diameter is 45cm and centre to centre spacing of the piles is 1.5m. If $C = 50$ kN/m^2, determine whether the failure would occur with the pile acting individually or as a group? Neglect bearing at the tip of the pile. All piles are 10m long. Take $M = 0.7$.   **(08 Marks)**

OR

10 a.   With a neat sketch explain negative skin friction.   **(08 Marks)**
    b.   A pile group of 9 piles, 10m long is used as a foundation for a bridge pier. The piles used are 30cm diameter with centre to centre spacing of 0.9m. The sub soil consists of clay with unconfined compressive strength of $1.5kg/cm^2$. Determine the efficiency neglecting bearing action. Take adhesion factor as 0.9.   **(08 Marks)**

* * * * *

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐   **15CV553**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Masonry Structures

Time: 3 hrs.   Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
       2. Use of IS 1905-1987 "code of practice for structural use of unreinforced masonry" is permitted.

Module-1

1 a. Briefly explain various factors influencing the strength of masonry. **(10 Marks)**
   b. Briefly explain classification of mortar. **(06 Marks)**

OR

2 a. Derive compressive strength of brick unit using elastic theory. **(10 Marks)**
   b. Discuss different types of classification of bricks. **(06 Marks)**

Module-2

3   Design an interior wall of a two storey building to carry 100 mm thick RCC slab with 3.0 m ceiling height. The wall is unstiffened and it supports a 2.65 m wide slab. Live load on the roof = 1.5 kN/m², live load on floor = 2.0 kN/m². Weight of terrace = 1.96 kN/m². Weight of floor finish = 0.8 kN/m². **(16 Marks)**

OR

4   An interior solid cross wall of a two storey building is 100 mm thick with a ceiling height of 3.0 m. It is constructed with a brick of compressive strength of 10 N/mm² and M1 type mortar is used. The walls are fully restrained both at top and bottom. Determine:
(i) Effective thickness   (ii) Effective height   (iii) Slenderness ratio
(iv) Stress reduction factor for e = 0   (v) Permissible compressive stress   **(16 Marks)**

Module-3

5 a. Explain the steps involved in the design of axially loaded solid wall. **(06 Marks)**
   b. Design an interior wall of a single storeyed workshop of height 5.4 m supporting a RCC roof. The bottom of the wall rests over a foundation block. Assume roof load = 45 kN/m [refer Fig.Q5(b)]
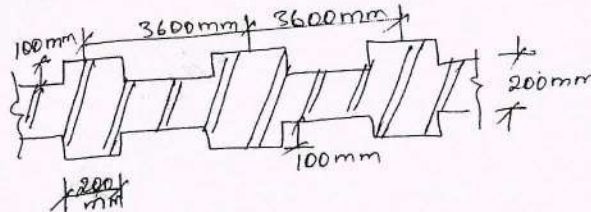

Fig.Q5(b)   **(10 Marks)**

OR

6 a. Explain the design criteria involved in the design of masonry. **(06 Marks)**
   b. Design an exterior wall of a workshop building 3.6 m high carrying steel truss at 4.5 m spacing. The wall is secured tied at the roof and floor level. The concentrated reaction from the roof truss is 30 kN at the centre of the wall. Roof loading = 7 kN/m. Ignore wind load. **(10 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-4

7   Design an interior cross wall AB of a storeyed building, supporting unequal concrete roof slab. The plan is shown in Fig.Q7. Assume triangular bearing pressure and loading as 10 kN/m^2. The storey height is 3.8 m and the wall is fixed to foundation block below.
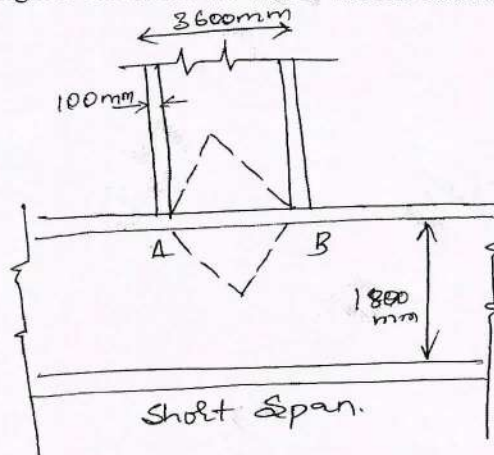

Fig.Q7   (16 Marks)

OR

8   Design an external wall of a single storeyed building, the inner leaf of which supports an eccentric load of 7 kN/m at an eccentricity of 25 mm as shown in Fig.Q8. The wall is an unstiffened, one which supports a concrete roof at the top and rests over a foundation block. Height of the wall is equal to 4.0 m.
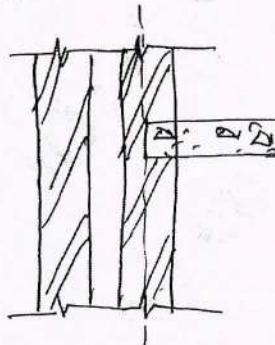

Fig.Q8   (16 Marks)

Module-5

9   a.   Briefly explain the steps involved to design free standing wall.   (06 Marks)
     b.   Design an exterior wall of a single storey warehouse of 3.5 m height. The loading on the wall consist of vertical load of 25 kN/m from the roof and wind pressure of 860 N/m^2. The wall is tied with metal anchor at the floor and roof levels.   (10 Marks)

OR

10   a.   With a neat sketch, mention different types of In-filled frames.   (06 Marks)
     b.   Explain different modes of failures in In-filled frame.   (10 Marks)

* * * * *

USN | | | | | | | | | | |

15CV561

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Traffic Engineering

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume missing data, if any suitably.

Module-1

1 a. Describe the different static characteristics of vehicles that effect road design and traffic performance. **(08 Marks)**

b. Enumerate the urban traffic problems in India. **(04 Marks)**

c. Explain modal integration. **(04 Marks)**

OR

2 a. A passenger car weighing 10kN is required to accelerate at a rate of 2 m/sec^2 in the first gear from a speed of 10kmph to 20kmph. The gradient is +2 percent and the road has a WBM surface in good condition. Frontal projection of the area of car is 2.15m^2. Car tyres have radius of 0.33m. The rear axle gear ratio is 3.82:1 and the first gear ratio is 2.78:1. Calculate the engine horse power needed and the speed of the engine. Make suitable assumptions. Coefficient of air resistance = 0.39, coefficient of rolling resistance = 0.025, tyre deformation factor = 0.945, transmission efficiency = 0.90. **(08 Marks)**

b. Explain briefly sustainable approach of land use and transport related to traffic planning.
(08 Marks)

Module-2

3 a. What is 30th highest hourly volume? Explain its importance with a neat sketch. **(08 Marks)**

b. The table below gives the consolidated data of spot speed studies on a section of a road. Determine the most preferred speed at which maximum proportion of vehicles travels.

Speed range kmph	No. of speed observations	Speed range kmph	No. of speed observations
0-10	0	50-60	216
10-20	11	60-70	68
20-30	30	70-80	24
30-40	105	80-90	0
40-50	233		

(08 Marks)

OR

4 a. A vehicle of weigh 2.0 tonne. Skids through a distance equal to 40m before colliding with another parked vehicle of weight 1.0 tonne. After collision both the vehicle skids through a distance equal to 12m before stopping. Compute the initial speed of the moving vehicle. Assume average coefficient of friction as 0.50. **(06 Marks)**

b. Explain various forms of presenting O and D data. **(06 Marks)**

c. List the objectives of carrying out parking studies. **(04 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-3

5 a. Briefly explain the design factors of rotary intersection with neat sketch. (08 Marks)
   b. Mention the various measures adopted to increase the safety of pedestrians. (08 Marks)

OR

6 a. Write a short note on the following:
   i) Signal coordination
   ii) Road markings. (08 Marks)
   b. What is channelization? Briefly explain the purpose of channelization. (08 Marks)

Module-4

7 a. Briefly explain the effect of traffic noise on the environment. (08 Marks)
   b. Explain the various characteristics considered in judging the efficiency of a transport mode. (08 Marks)

OR

8 a. Explain the different measures adopted to control air pollution created by road traffic. (08 Marks)
   b. Explain how to promote non-motorized transport in a country, indicating its advantages. (08 Marks)

Module-5

9 a. Define intelligent transport system. Brief out its application in traffic engineering field. (08 Marks)
   b. What do you mean by "area traffic control"? Mention its objectives, indicating the types of methods adopted in traffic control. (08 Marks)

OR

10 Define transportation system management. Mention the various well-known traffic management measures. Explain any two traffic management measures in detail. (16 Marks)

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ 15CV563

Fifth Semester B.E. Degree Examination, Jan./Feb.2021
Remote Sensing and GIS

Time: 3 hrs.   Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a. What is remote sensing? What are the principles involved in remote sensing technique? **(06 Marks)**
   b. List out the advantages and limitations of remote sensing technique. **(10 Marks)**

OR

2   a. Explain the elements of remote sensing system. **(06 Marks)**
   b. Define resolution. Explain the types of resolution in remote sensing. **(04 Marks)**
   c. With a neat sketch, explain the interaction of EMR, with Earth's surface. **(06 Marks)**

Module-2

3   a. Define sensor. Explain the significant characteristics of a sensor. **(10 Marks)**
   b. Write a note on LandSat, ENVISAT, Cartosat. **(06 Marks)**

OR

4   a. What is a platform? Explain the different categories of Remote Sensing Platforms. **(08 Marks)**
   b. Explain systematic and non-systematic errors in Remote Sensing. **(08 Marks)**

Module-3

5   a. Describe GIS. Explain the components of GIS. **(08 Marks)**
   b. Explain briefly map projections and its types. **(08 Marks)**

OR

6   a. Define GIS. Explain briefly about GIS operations and its types. **(08 Marks)**
   b. Write a note on geographic co-ordinated system and projected co-ordinate system. **(08 Marks)**

Module-4

7   a. What is a vector data? Mention the advantages and dis-advantages of vector data. **(08 Marks)**
   b. Explain the types of Raster data. **(08 Marks)**

OR

8   a. What is a Raster data? Write the advantages and disadvantages of Raster data. **(08 Marks)**
   b. Describe topology and its importance in GIS and mention its applications. **(08 Marks)**

Module-5

9   a. What is land use/ land cover? Mention the application of remote sensing in land use/ land cover analysis. **(08 Marks)**
   b. Write a note on change detection and application of remote sensing in water resources. **(08 Marks)**

OR

10   a. Write a note on applications of "R.S and GIS" in natural resources. **(08 Marks)**
   b. Explain the following urban planning traffic management. **(08 Marks)**

* * * * *

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN | | | | | | | | | | |

15CV661

Sixth Semester B.E. Degree Examination, Jan./Feb. 2021
Water Resources Management

Time: 3 hrs.

Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define Hydrological cycle with a neat sketch and explain different process in hydrological cycle. **(08 Marks)**
   b. Explain Global water resources and Indian water resources. **(08 Marks)**

OR

2 a. Explain Water balance equation. Mention its importance. **(08 Marks)**
   b. Explain Groundwater resources. Differentiate between confined aquifer and unconfined aquifer. **(08 Marks)**

Module-2

3 a. Describe the necessity of water resources planning and management. **(08 Marks)**
   b. Explain System Components. Describe the planning scale of water resource management. **(08 Marks)**

OR

4 a. Explain the water resource planning and management analysis. **(08 Marks)**
   b. Describe the planning and management aspects. Discuss the post planning and management issues. **(08 Marks)**

Module-3

5 a. Define IWRM. Describe the principles of IWRM. **(08 Marks)**
   b. Explain the implementation of IWRM. **(08 Marks)**

OR

6 a. Describe the Legislative and Organizational framework of IWRM along with assessment. **(08 Marks)**
   b. Describe the types and forms of private sector involvement. **(08 Marks)**

Module-4

7 a. Explain Legal framework of water. **(08 Marks)**
   b. Explain National water laws and other key issues. **(08 Marks)**

OR

8 a. Describe Irrigation Management transfer policies and activities. **(08 Marks)**
   b. Explain Origin of WUA's and its Byelaws. **(08 Marks)**

Module-5

9 a. Explain Water harvesting techniques. Discuss the necessity of water harvesting. **(08 Marks)**
   b. Describe the design of small harvesting structure like farm ponds (layout & design). **(08 Marks)**

OR

10 a. Explain Micro catchment water harvesting. Mention advantages of micro catchments. **(08 Marks)**
   b. Describe the various rainwater harvesting techniques. **(08 Marks)**

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN | | | | | | | | | |

15CV62

Sixth Semester B.E. Degree Examination, Jan./Feb. 2021
Design of Steel Structural Elements

Time: 3 hrs.   Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS:800-2007 and SP:6(1)-1964 or steel table is permitted.

Module-1

1 a. Mention any four advantages and four disadvantages of steel structures. **(08 Marks)**
   b. Briefly explain the different loads used in the steel structural design and also the combinations of loads. **(08 Marks)**

OR

2 a. Determine the shape factor of a rectangular section of breadth 'b' and depth 'd'. **(06 Marks)**
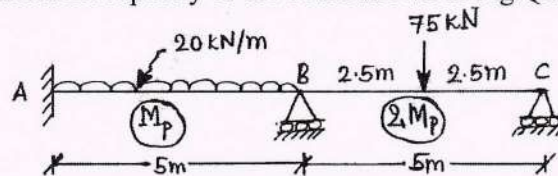   b. Determine the plastic moment capacity of the beam shown in Fig.Q2(b).

Fig.Q2(b)   **(10 Marks)**

Module-2

3 a. Write a short note on HSFG bolt. **(04 Marks)**
   b. Two plates 10 mm and 18 mm thick are to be jointed by double cover butt joint. Design the joint for the following data:
      (i)   Factored design load = 750 kN
      (ii)   Bolt diameter = 20 mm
      (iii) Grade of steel = Fe410
      (iv)   Grade of bolts = 4.6
      (v)   Cover plates 2 (one on each side) = 8 mm thick **(12 Marks)**

OR

4 a. A tie member of a truss consists of double angle section, each 80 mm × 80 mm × 8 mm welded on the opposite side of a 12 mm thick gusset plate as shown in Fig.Q4(a). Design a fillet weld for making connection in the workshop. The tensile force in the member is 400 kN.
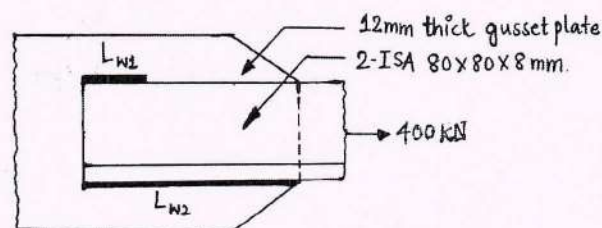

Fig.Q4(a)   **(12 Marks)**
   b. What are advantages of welded connections over bolted connections? **(04 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-3

5 a. Explain the possible failure modes of an axially load column. **(04 Marks)**

b. Determine the design axial load on the column section ISMB 350, given that the height of the column is 3.0 m and both ends are hinged. Given $f_y = 250$ N/mm², $f_u = 410$ N/mm², $E = 2 \times 10^5$ N/mm². **(12 Marks)**

OR

6 Design a 8m long built-up laced column to carry a factored axial load of 1250 kN. The column is restrained in position but not in direction at each end. Provide a single lacing system making connections with 16 mm diameter bolts. The column shall consists of two channels placed toe to toe at a suitable spacing. **(16 Marks)**

Module-4

7 Design a single angle section to carry a factored tensile force of 200 kN. Bolts of 20 mm diameter are to be provided for the connection of the member to the gusset plate. Take $f_y = 250$ N/mm², $f_u = 410$ N/mm². The design strength of a 20 mm diameter bolt = 45.3 kN. **(16 Marks)**

OR

8 Design a bolted gusseted base which consist of a column of ISHB 200@ 40 kg/m along with a cover plate on both sides carrying a factored load of 2500 kN. The grade of concrete is M20 and SBC of soil is 220 kN/m². **(16 Marks)**

Module-5

9 Design a simply supported beam of span 5m carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The uniformly distributed load is made up of 20 kN/m imposed load and 20 kN/m dead load. The section is stiff against bearing. Assume Fe 410 grade steel. **(16 Marks)**

OR

10 Design a simply supported beam of span 3m. The beam is subjected to a factored bending moment of 250 kN-m and factored shear force of 120 kN. The beam is laterally unsupported. **(16 Marks)**

* * * * *

USN | | | | | | | | | | |

15CV64

Sixth Semester B.E. Degree Examination, Jan./Feb. 2021
Water Supply and Treatment Engineering

Time: 3 hrs.   Max. Marks: 80

Note : 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume any missing data suitably.*

Module-1

1 a. Write the needs of protected water supply.   (04 Marks)
   b. Explain various types of water demands.   (06 Marks)
   c. Explain the factors affecting per capita demand.   (06 Marks)

OR

2 a. Mention the methods of forecasting population and explain any two of them.   (08 Marks)
   b. Write the factors considered for the design period.   (04 Marks)
   c. Compare the population of the year 2000 and 2006 for a city whose population in the year 1930 was 25000 and in the year 1970 was 47000 by Geometric Increase method. (04 Marks)

Module-2

3 a. Write the objectives of water treatment.   (04 Marks)
   b. With the help of treatment flow chart, write the significance of each unit.   (08 Marks)
   c. Write the sources and characteristics of surface sources and subsurface sources of water with regard to quality and quantity.   (04 Marks)

OR

4 a. Define Sampling of water and explain methods of sampling.   (08 Marks)
   b. Write the BIS for following water quality parameters and write their significance :
      i) Nitrate   ii) Fluoride   iii) Iron   iv) E - Coli.   (08 Marks)

Module-3

5 a. Briefly explain types of settling or sedimentation.   (06 Marks)
   b. Define Coagulation and Flocculation in water treatment process.   (04 Marks)
   c. The maximum daily demand at a water treatment plant was 12 million liter per day. Design the dimensions of a suitable rectangular sedimentation tank for the raw supplies, assuming detention time of 6 hours and velocity of flow as 20cm per minute.   (06 Marks)

OR

6 a. Explain four mechanism of filteration used in filteration of water.   (06 Marks)
   b. With the help of sketch, explain working of Rapid Sand gravity filter.   (06 Marks)
   c. Design a Rapid sand filter unit without under drainage system for 4 MLD of water supply by assuming 4% of filtered water is required for washing of filter every day.   (04 Marks)

Module-4

7 a. Define softening of water. Explain Lime soda process and Zeolite process of water softening with equation.   (08 Marks)
   b. Explain the following process :   i) Reverse osmosis   ii) Nano - filteration.   (08 Marks)

OR

8 a. Explain different methods of disinfection with their merits and demerits. **(08 Marks)**

   b. Define Fluoridation and Defluoridation design of water and explain the Nalgonda technique of Defluoridation process. **(08 Marks)**

Module-5

9 a. Write the function of intake structures and write the factors governing the location of intake. **(08 Marks)**

   b. With the help of neat sketch, explain twin well type of River intake structure. **(08 Marks)**

OR

10 a. Explain Economical diameter of Raising mains. **(04 Marks)**

   b. Water has to be supplied to a town with one lakh population at a rate of 150 Lpcd from a river 2000m away. The difference in elevation between the lowest water level in the sump and the reservoir is 36mt. If the demand has to be supplied in 8 hours, determine the size of the main and the BHP of the pump required. Assume maximum demand as 1.5 times the average demand. Assume f = 0.0075 , Velocity in the pipe 2.4m/sec and efficiency of pump 80 percent. **(06 Marks)**

   c. Briefly explain different methods of Distribution of water. **(06 Marks)**

* * * * *

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

Fifth Semester B.E. Degree Examination, Jan./Feb. 20:
Management and Engineering Economics

Time: 3 hrs.   Max.

Note: *Answer any FIVE full questions, choosing ONE full question from each*

Module-1

1 a. Define Management. Differentiate between Administration and Management.
   b. Explain briefly the purpose and planning.

OR

2 a. Briefly explain , whether management is a Science (or) Art.
   b. Explain briefly the main steps involved in planning.

Module-2

3 a. Explain with a neat diagram, line and staff organization.
   b. Briefly explain the techniques of selection.

OR

4 a. Describe briefly the essentials of a Sound Control System.
   b. Briefly explain the Maslow's Hierarchy of needs.

Module-3

5 a. Explain how Cash Flow Diagrams (CFD) are helpful to the decision make:
      and solve Engineering Economics problems and give borrower's and lender
      for cash flow diagram.
   b. A person is planning for his retired life. He has 10 more years of service. H
      deposit 20% of his salary which is Rs 10,000/- at the end of the First year an
      wishes to deposit the same amount (Rs 10,000) with an Annual increase of R
      next 9 years with an interest rate of 20%. Find the total amount at the end of
      the above series.

OR

6 a. State and explain Law of Returns.
   b. Determine the effective interest rate in the following cases :
      i)   Nominal rate of 12% compounded monthly with time interval of one yea
      ii) Nominal rate of 18% compounded weekly with a time interval of one yea
      iii) Nominal rate of 13% compounded monthly with a time interval of two y
      iv) Nominal rate of 9% compounded semi annually with a time interval of tv

Module-4

7 a. Two motorcycles of brand "A" and "B" are available on the following terms

b. A stand by lighting generator is required for a shop. Two types are ava generators have a life of 4 years and the interest rate is 15% per year, which o equivalent annual cost.

	Type - 1	Type - 2
First - Cost	Rs 5,000/-	Rs 3,200/-
Salvage value	Rs 1,000/-	- Nil -
Annual operating costs	Rs 780/-	Rs 950/-

OR

8 a. Compare the two investment proposals given below, if the firms MARR is 15 the two proposals is 10 years. Compare using IRR.

Investment proposal	Initial Cost	Annual Return
Proposal 1	5,50,000/-	1,40,000/-
Proposal 2	6,25,000/-	1,60,000/-

b. A crane can be taken on lease for a project for 3 years for Rs 1,80,000/- maintenance included. It can also be purchased for Rs 2,40,000/- and be sol 3 years for Rs 1,00,000/-. Maintenance costs are expected to be Rs 5,000/- first two years and Rs 10,000/- for the third year payable at the end of eacl interest rates would the two alternatives be equivalent?

Module-5

9 a. Briefly explain the functions of Estimating department.
b. A CNC machine costs Rs 30,00,000/- is estimated to serve for 8 years after w value is estimated to be Rs 2,50,000/- Find
   i) Depreciation fund at the end of the 5th year by Fixed percentage method a Balance method.
   ii) Book value of the machine after 4th year and 6th year by Declining Balanc

OR

10 a. Explain with a block diagram the elements of cost and components of cost.
b. 'Pizza corner" employed 75 workers in a particular month to work in the ou for home delivery. The following are the details of expenditure :
   i) Cost of material = Rs 80,000/-
   ii) Rate of wages for each workers = Rs 20 per hour of normal duty, Rs 40 overtime duty.
   iii) Man hours per day of normal duty = 8 hours.
   iv) Number of holidays per month (without wages) = 5 days.
   v) Total overhead expenses = Rs 20,000/-.
   vi) Total overtime availed by workers = 200 hours.
   vii) Profit = 20% of total cost.
   Determine   i)   Total cost for the month.

USN ☐☐☐☐☐☐☐☐☐☐   **18CV51**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Construction Management and Entrepreneurship

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a.   Discuss the ideal characteristics that a Management should exhibit.   (07 Marks)
    b.   Briefly explain the key steps involved in Construction planning.   (06 Marks)
    c.   What are the principles based on which organizational structure has to be framed? (07 Marks)

OR

2   a.   What is Work break down structure? Mention its significance in Construction project.
                                                             (06 Marks)
    b.   Discuss suitability , advantages and disadvantages of Autocratic and Democratic style of Management   (06 Marks)
    c.   Draw the network diagram and identify critical path using CPM for the following activity data :

Activity	1-2	2-3	2-4	3-5	3-6	4-5	4-7	5-8	6-8	7-8
Duration (Days)	5	2	6	4	4	2	3	7	8	2

                                                       (08 Marks)

Module-2

3   a.   What is the purpose of having material management system in construction?   (04 Marks)
    b.   Enumerate the factors to be considered for selection of construction equipments.   (07 Marks)
    c.   Explain different class of labour employed in construction project.   (09 Marks)

OR

4   a.   What are the factors influencing Inventory Management?   (05 Marks)
    b.   Estimate the hourly production of a Shovel with bucket capacity of $0.96m^3$ and cycle time of 30 seconds. Shovel is used to excavate hard soil in an open area. Excavated earth is to be loaded in waiting dump truck, positioned at 60^0. Equipment is utilized for 50 minutes in one hour.   (07 Marks)
    c.   List the factors affecting labour productivity. Briefly discuss any three factors.   (08 Marks)

Module-3

5   a.   Define Engineering Ethics. Mention the duties of Engineers, with respect to ethical practices.   (06 Marks)
    b.   Discuss the importance of Inspection in Construction.   (08 Marks)
    c.   Highlight the common causes of accident in Construction site.   (06 Marks)

OR

6   a.   Explain the safety measures to be adopted for excavation.   (06 Marks)
    b.   With reference to profession practice, discuss   i)   Conflict of Interest   ii)   Gifts and Bribes.   (06 Marks)
    c.   Explain the concept of Total Quality Management.   (08 Marks)

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-4

7 a. Define the following terms : i) Principal Amount   ii) Rate of Interest
   iii) Interest Amount   iv) Interest Period. **(04 Marks)**

   b. Discuss the principles of Engineering Economics. **(06 Marks)**

   c. There are two alternatives for purchasing a concrete mixer and details are as follows. Choose best alternative using PW method @ 10% rate of interest. **(10 Marks)**

Parameter	Alternative - 1	Alternative - 2
Purchase cost (Rs)	3,00,000/-	2,00,000/-
Annual Operating and Maintenance cost (Rs)	20,000/-	35,000/-
Expected Salvage value (Rs)	1,25,000/-	70,000/-
Useful life (years)	05	05

OR

8 a. Briefly explain the concept of Minimum Cost Analysis. **(06 Marks)**

   b. A Construction Company is planning to invest Rs 8,00,000/- for purchase of construction equipment with useful life of 10 years. Equipment is expected to generate net annual profit of Rs 1,40,000/- with expected salvage value of Rs 2,00,000/-. Compute the Rate of Return and comment on the investment if Company's MARR is 10%. **(06 Marks)**

   c. Initial cost of an infrastructure project, expected to serve perpetually is Rs 1,50,00,000/-. Annual maintenance cost is Rs 8,00,000/- Renovation cost at end of every 15 years is Rs 18,00,000/-. Find the capitalized cost at an interest rate of 8% per year. **(08 Marks)**

Module-5

9 a. Enumerate services offered by TECSOK. **(06 Marks)**

   b. Discuss the characteristics of MSME's. **(06 Marks)**

   c. Explain different concept of Entrepreneurship. **(08 Marks)**

OR

10 a. List the benefits for investors and host country in Direct Foreign Investment. **(04 Marks)**

   b. Briefly discuss challenges in International Entrepreneurship. **(08 Marks)**

   c. What are the different sources of Finance for Entrepreneur? Explain. **(08 Marks)**

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN | | | | | | | | | |

18CV52

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Analysis of Indeterminate Structures

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 Analyze the continuous beam shown in Fig.Q1 by slope deflection method. Draw BMD, SFD and elastic curve.
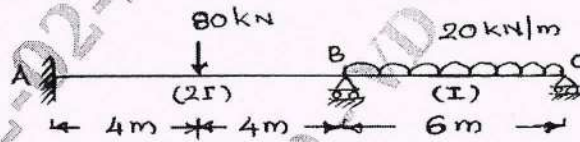

Fig.Q1

(20 Marks)

OR

2 Analyze the portal frame shown in Fig.Q2 by slope deflection method. Draw BMD and elastic curve.
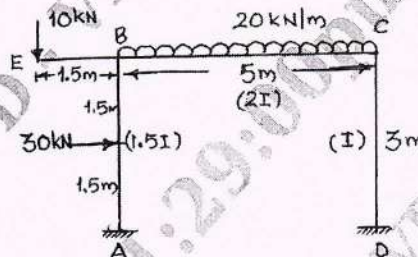

Fig.Q2

(20 Marks)

Module-2

3 Analyze the continuous beam shown in Fig.Q3 by using moment distribution method. Draw BMD SFD and elastic curve the support B sinks by 1 cm. Take EI = 500 kN-m^2.
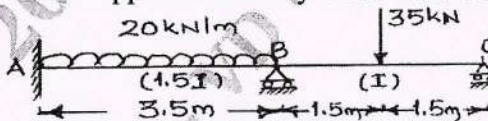

Fig.Q3

(20 Marks)

OR

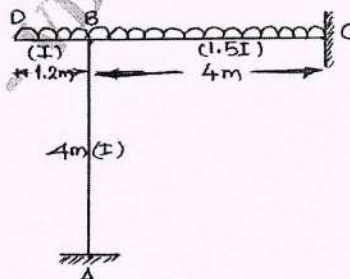4 Analyze the portal frame shown in Fig.Q4 by moment distribution method. Draw BMD, SFD and elastic curve.

Fig.Q4

(20 Marks)

1 of 3

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-3

5 Analyze the continuous beam shown in Fig.Q5 by using Kani's method. The support C sinks by 20 mm. Take E = 200 kN/mm², I = 170 × 10⁶ mm⁴. Draw BMD, SFD and EC.

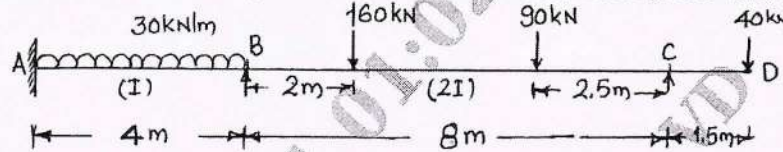Fig.Q5   (20 Marks)

OR

6 Analyze the portal frame shown in Fig.Q6 by using Kani's method. Assume EI is constant throughout. Draw BMD and elastic curve.

Fig.Q6   (20 Marks)

Module-4
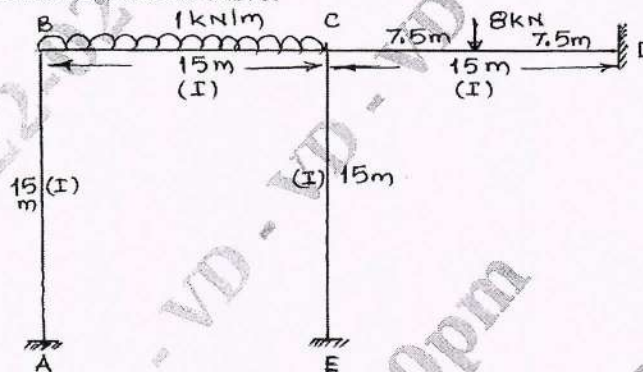
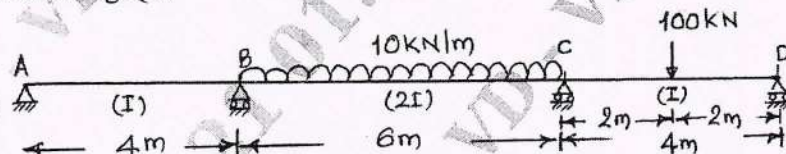7 Analyze the continuous beam by using flexibility matrix method. Draw BMD, SFD and elastic curve. Refer Fig.Q7.

Fig.Q7   (20 Marks)

OR

8 Analyze the truss shown in Fig.Q8 by flexibility matrix method choosing force in the member AD as redundant. Assume constant EI for all the members.
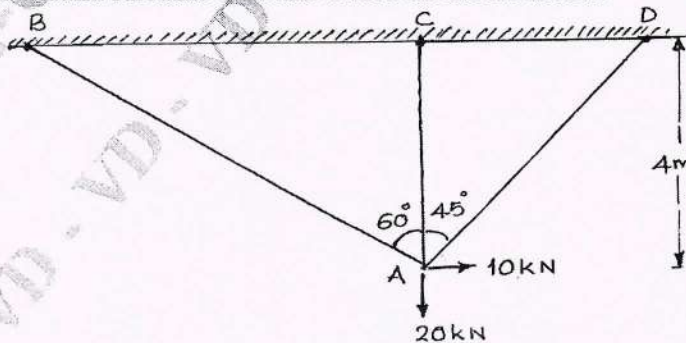

Fig.Q8   (20 Marks)

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-5

9   Analyze the continuous beam shown in Fig.Q9 by using stiffness matrix method. Draw BMD, SFD and elastic curve.
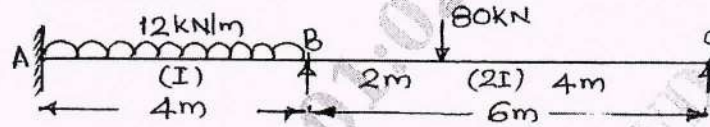

Fig.Q9

(20 Marks)

OR

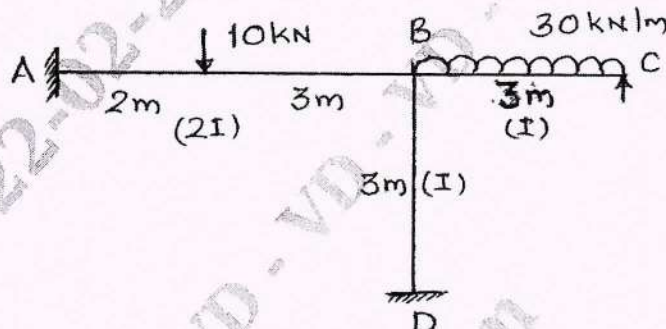10   Analyze the portal frame shown in Fig.Q10 by stiffness matrix method. Draw BMD and elastic curve.

Fig.Q10

(20 Marks)

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

18CV53

USN ☐☐☐☐☐☐☐☐☐☐

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Design of RC Structural Elements

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Use of IS : 456-2000, SP-16 is permitted.*
3. *Assume suitable additional data, if necessary.*

Module-1

1 a. Distinguish between working stresses and limit state methods design. **(08 Marks)**
   b. Write brief notes on :
      i) Balanced section
      ii) Under reinforced section
      iii) Deflection
      iv) Cracking. **(12 Marks)**

OR

2 a. Explain the factors that affect short and long term deflections. **(08 Marks)**
   b. A cantilever of 3.5m span is 300mm wide and 600mm deep. It is subjected to a maximum bending moment of 125kN-m due to uniformly distributed service loads of which 50% moment is due to permanent loads. The beam is reinforced with 4 bars of 20mm diameter at an effective cover of 50mm in the tension zone. Determine the immediate deflection. **(12 Marks)**

Module-2

3 a. An RC beam of rectangular section 300mm wide and overall depth of 850mm is reinforced with 4 bars of 25mm diameter on the tension side. Effective cover is 50mm. Find the ultimate moment of resistance of the section, if $f_{ck} = 20N/mm^2$ and $f_y = 415N/mm^2$. Find the additional reinforcement required to make this a balanced section. **(10 Marks)**
   b. Determine the moment of resistance of beam with the following data :
      b = 350mm, d = 900mm, d' = 50mm.
      Tension reinforcement: 5-20mm of Fe415 grade; compression reinforcement 2-20mm of the same grade. Grade of concert M20. **(10 Marks)**

OR

4 a. A T-Beam of flange width 850mm, flange thickness 100mm, rib width 275mm has an effective depth of 475mm. The beam is reinforcement with 4-20mm bars. Find the ultimate moment of resistance. Use M20 concrete and Fe415 steel. **(10 Marks)**
   b. Determine the shear capacity of the beam section with the following details:
      Size 230mm × 720mm effective depth reinforced with 5 number of 16mm diameter with 8mm diameter stirrups @300mm C/C. Use Fe 415 steel and M20 concrete. **(10 Marks)**

Module-3

5 Design a beam of effective span 6m to support a total working load of 12kN/m including the self weight of the beam. The width of the beam is limited to 250mm. Design for flexure and shears only, No need to curtail the bars. Use 16mm diameter main bars and 8mm diameter stirrups. Use M20 concrete and Fe415 steel. Show reinforcement details. **(20 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6   A T-Beam and slab floor system has a slab 125mm thick spanning between T-Beams. Which are spaced at 3.5m apart. The beams have a clear span of 8m and end bearings are 300mm walls. The live load on the floor is 4kN/m^2 and floor finish is 0.6kN/m^2. Take overall depth of the beam equal to 600mm and web width to 300mm. Take self weight of the slab and web as 13.90kN/m provide 20mm diameter main bars and 8mm diameter two legged stirrups. Use M20 concrete and Fe415 steel. Design the intermediate T-Beam for flexure and shear only.   (20 Marks)

Module-4

7   Design an RC slab for room measuring 4m × 5m is inside. The slab carries a live load of 2kN/m^2 and is finished with 20mm topping of unit weight 24kN/m^3. The slab is simply supported on all four edges with corners free to lift. No need to check for shear. Use M20 concrete and Fe415 steel.   (20 Marks)

OR

8   Design a dog legged stair for an office building in a room measuring 2.8m × 5.8m, clear vertical distance between the floors is 3.6m. The width of flight is to be 1.25m. Assume imposed load of 3kN/m^2. Use M20 concrete and Fe415 grade steel. Assume that the stairs are supported on 230mm width support at the outer edges of landing slabs. Sketch the reinforcement details. Design of one flight is enough.   (20 Marks)

Module-5

9   a. A reinforced concrete column of 2.75m unsupported length carries an axial load of 1600kN. Design a square column using M20 concrete and Fe415 steel. Assume both ends of the column as hinged.   (10 Marks)

   b. Determine the reinforcement required for a short column for the following data :
   Columns size : 300mm × 600mm, $P_u = 1800$kN ; $M_{ux} = 110$kN-m with respect to major axis. Use M25 concrete and Fe415 steel. Sketch reinforcement details. Assume 50mm effective cover.   (10 Marks)

OR

10 A square footing has to transfer a load of 1000kN from a square column of 400mm × 400mm. Assume M20 concrete and Fe415 steel, and SBC of soil 200kN/m^2. Design the footing and sketch reinforcement details.   (20 Marks)

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Basic Geotechnical Engineering

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With the help of 3-phase diagram, explain (i) Void ratio (ii) Porosity (iii) Water content (iv) Degree of saturation. **(06 Marks)**

   b. With usual notations, derive the relationship,
   $$\gamma_d = \frac{(1-n_a)G.\gamma_w}{1+\omega G}$$
   (06 Marks)

   c. A fully saturated soil sample has a water content of 35% and specific gravity of 2.65. Determine its porosity, saturated unit weight and dry unit weight. If the w.c. is 15%, what will be the amount of water to be added for saturation? **(08 Marks)**

OR

2 a. Explain the Indian standard soil classification system. **(06 Marks)**

   b. Define stoke's law. What are its assumptions and limitations? **(06 Marks)**

   c. A liquid limit test on a clayey sample gave the following results. The plastic limit of the soil is 20%.

Number of blows	12	18	22	34
Water content, %	56	52	50	45

   Plot flow curve and obtain:
   (i) Liquid limit   (ii) Flow Index   (iii) Plasticity Index   (iv) Toughness Index. **(08 Marks)**

Module-2

3 a. Briefly explain how water content, compactive effort and type of soil affect compaction. **(06 Marks)**

   b. Distinguish between standard Proctor and Modified Proctor compaction tests. **(04 Marks)**

   c. The following data was obtained from standard Proctor compaction test.

Water content, %	5.90	7.50	9.70	11.65	13.85
Weight of wet sample, N	18.20	19.50	20.10	20.00	19.70

   G = 2.70, Volume of mould = 9.5×10^{-4} m³. Plot the compaction curve and zero air voids line. Determine OMC and maximum dry density. **(10 Marks)**

OR

4 a. Explain with sketches the various soil structures. **(06 Marks)**

   b. With sketch explain the three principal clay minerals. **(08 Marks)**

   c. Explain electrical diffuse double layer and adsorbed water. **(06 Marks)**

Module-3

5 a. Derive the equations for average coefficient of permeabilities in vertical and horizontal directions. **(08 Marks)**

   b. Explain with a neat sketch the method of locating the phreatic line in a homogeneous earth dam with horizontal filter. **(06 Marks)**

   c. If during a variable head permeability test on a soil sample, equal time intervals are noted for drops of head from h_1 to h_2 and again from h_2 to h_3. Find the relationship between h_1, h_2 and h_3 **(06 Marks)**

OR

6 a. State the characteristics and uses of flownets. **(06 Marks)**
   b. Explain the terms superficial velocity and seepage velocity. Derive the relationship between them. **(08 Marks)**
   c. Compute the quantity of water seeping under a weir per day for which the flownet has been satisfactorily constructed. The coefficient of permeability is 2×10^{-2} mm/s. $n_f = 5$ and $n_d = 18$. The difference in water level between upstream and downstream is 3.0 m. The length of the weir is 60 m. **(06 Marks)**

Module-4

7 a. What are the advantages and disadvantages of direct shear test over triaxial test? **(06 Marks)**
   b. Explain sensitivity and thixotropy of clay. **(06 Marks)**
   c. The stresses on a failure plane in a drained test on a cohesionless soil are as under:
   Normal stress (σ) = 100 kN/m^2
   Shear stress (τ) = 40 kN/m^2
   Determine the angle of shearing resistance and the angle which the failure plane makes with the major principal plane. Also find the major and minor principal stresses. **(08 Marks)**

OR

8 a. Explain Mohr-Coulomb failure theory of soils. **(06 Marks)**
   b. Explain Vane shear test with a neat sketch. **(06 Marks)**
   c. A consolidated undrained test was conducted on a clay sample and the following results were obtained:-

Cell pressure (kN/m^2)	200	400	600
Deviator stress at failure, kN/m^2	118	240	352
Pore water pressure at failure, kN/m^2	110	220	320

Determine the shear strength parameters with respect to,
   (i)   Total stresses.
   (ii)   Effective stresses. **(08 Marks)**

Module-5

9 a. Explain spring analogy theory of consolidation of soil. **(08 Marks)**
   b. What is pre consolidation pressure? How is it determined by Casagraude's graphical method? **(06 Marks)**
   c. In a consolidation test, the void ratio of soil sample decreases from 1.20 to 1.10 when the pressure increases from 160 to 320 kN/m^2. Determine the coefficient of consolidation, if the coefficient of permeability is 8×10^{-7} mm/sec. **(06 Marks)**

OR

10 a. Explain square root of time fitting method. **(06 Marks)**
   b. A 20 m thick isotropic clay layer overlies an impervious rock. The coefficient of consolidation of soil is 5×10^{-2} mm^2/sec. Find the time required for 50% and 90% consolidation. Time factors are 0.2 and 0.85 for 50% and 90% consolidations respectively. **(08 Marks)**
   c. Explain pre consolidated, normally consolidated and under consolidated soil. **(06 Marks)**

* * * * *

USN | | | | | | | | | |

18CV55

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Municipal Wastewater Engineering

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the necessity of treating waste water.   (08 Marks)
   b. Explain with a neat sketch, construction and working of a manhole.   (08 Marks)
   c. Explain the principles of house drainage.   (04 Marks)

OR

2 a. Define wet weather flow. Explain factors affecting wet weather flow.   (08 Marks)
   b. The drainage area of one sector of a town 100 hectares having a population of one lakh persons, the rate of water supply is 150 LPCD, 80% of which flows out as sewage. The peak flow of sewage is 2.5 times the average flow. The area of the town is classified as follows:

Percentage of total area	Type of Surface	Run off coefficient
45	Hard pavements and roofs	0.85
20	Unpaved	0.45
20	Garden and lawn	0.25
15	Wooded area	0.15

If time of concentration for the area is 30 minutes. Find the maximum run off. Use the following formula for intensity of Rainfall $R = \dfrac{900}{(t+60)}$.   (08 Marks)
   c. What are traps? Explain the importance of traps.   (04 Marks)

Module-2

3 a. Write the flow diagram employed to treat municipal waste water and indicate the importance of each treatment unit.   (08 Marks)
   b. Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm diameter with sand particle of 1 mm diameter and specific gravity 2.66. Assume $\beta = 0.06$ and $f = 0.02$. Assume the sewer to run half full. Take $N = 0.012$.   (08 Marks)
   c. What is sampling? Mention types of sampling.   (04 Marks)

OR

4 a. Explain the concept of BOD and COD. Enumerate their limitation.   (08 Marks)
   b. The BOD of a sewage incubated for one day at 30°C has been found to be 100 mg/l. What will be the 5 day 20°C BOD? Assume $K = 0.12$ (Base 10) at 20°C.   (08 Marks)
   c. Briefly explain self cleansing velocity.   (04 Marks)

Module-3

5 a. Discuss the importance of screening in waste water treatment operation and explain types of screens.   (08 Marks)
   b. What do you understand by self purification of natural water bodies? Explain the factors affecting self purification.   (08 Marks)
   c. Explain sewage farming. Mention the various methods of sewage farming.   (04 Marks)

OR

6 a. With neat sketch, explain the different zones of self purification. **(08 Marks)**

   b. A stream saturated with DO, has a flow of 1.2 m^3/s, BOD of 4 mg/l and rate constant of 0.3 per day. It receives an effluent discharge of 0.25 m^3/s having BOD 20 mg/l DO 5mg/l and rate constant 0.13 per day. The average velocity of flow of the stream is 0.18 m/s. Calculate the DO deficit at point 20 km downstream. Assume that the temperature is 20°C throughout and BOD is measured at 5 days. Take saturation DO at 20°C as 9.17 mg/l.
   (08 Marks)

   c. Draw a neat sketch of skimming tank. Enumerate importance of skimming tank. **(04 Marks)**

Module-4

7 a. Explain with neat sketch the working of Trickling Filter. What is the principle on which it working? **(08 Marks)**

   b. Explain the different stages involved in the sludge digestion process. **(08 Marks)**

   c. Briefly explain R.B.C. **(04 Marks)**

OR

8 a. Mention the various types of modification of ASP and explain any two methods in brief.
   (08 Marks)

   b. Design suitable dimensions of a circular trickling filter units for treating 5 million litres of sewage per day BOD of sewage is 150 mg/l. **(08 Marks)**

   c. Write short note on drying beds. **(04 Marks)**

Module-5

9 a. Discuss in brief the Nitrification and Denitrification process in advance waste water treatment. **(08 Marks)**

   b. Draw a neat sketch of septic tank. Write the design criteria required for septic tank.
   (08 Marks)

   c. Write a short note on advance oxidation process. **(04 Marks)**

OR

10 a. Discuss in brief the biological and chemical methods of removal of phosphorous from waste water. **(08 Marks)**

   b. Write short notes on:
   (i) Electro coagulation
   (ii) Soak pits
   (iii) Eco toilets **(12 Marks)**

* * * * *

USN | | | | | | | | | |

18CV56

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Highway Engineering

Time: 3 hrs.

Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume the missing data, if any, as per IRC codes.*

Module-1

1 a. List the objectives and functions of the following in Highway development in India.
   i) Indian Roads congress
   ii) Central Road Research Institute. **(06 Marks)**
   b. What is the contribution of KRDCL and KSHIP in the road development in Karnataka? **(08 Marks)**
   c. List and elaborate the various advantages and disadvantages of Road transport compared with other modes of transport. **(06 Marks)**

OR

2 a. Elaborate on various salient features of VISION 2021. **(06 Marks)**
   b. What are the various factors affecting highway alignment? Explain each one, in detail with the help of neat sketches. **(08 Marks)**
   c. What are the objectives of preliminary survey in highway Alignment? Enumerate the detail to be collected in it. **(06 Marks)**

Module-2

3 a. Calculate the stopping sight distance on a highway for a vehicle moving at 80kmph on a
   i) Level Road
   ii) On a road having 1 in 100 grade (ascending and descending)
   Assume other data as per IRC recommendations. **(08 Marks)**
   b. Explain PIEV theory with a neat sketch. **(06 Marks)**
   c. What are the various factors affecting friction? Also explain skid and slip failures, in detail. **(06 Marks)**

OR

4 a. Enumerate the steps for practical design of super elevation considering mixed traffic. **(06 Marks)**
   b. Find the total width of pavement on a horizontal curve for a two lane National highway to be aligned along a rolling terrain with ruling minimum radius. **(08 Marks)**
   c. List the various objects of providing a horizontal transition curve? Also explain the various shapes of transition curve and ideal transition curve. **(06 Marks)**

Module-3

5 a. List and explain the various desirable properties of subgrade soil as highway material. **(06 Marks)**
   b. List the various properties of coarse aggregate and the tests to be conducted to find each property of course aggregate. **(06 Marks)**
   c. How do you find CBR value in the Laboratory? Explain the test procedure with a neat sketch. **(08 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6 a. A plate load test was conducted on a soaked subgrade during monsoon season using a plate of diameter 30cm. The load values corresponding to the mean settlement dial readings are given below. Determine the modulus of subgrade reaction for the standard plate :

Mean settlement value, in mm	0.0	0.26	0.52	0.76	1.02	1.26	1.53	1.76
Load values, in Kg	0.0	540	1010	1290	1510	1550	1730	1900

(08 Marks)

b. What do you understand about HRB soil classification? Explain in detail? **(06 Marks)**

c. Calculate the ESWL of a dual wheel assembly arraying 2044kg each for a trail pavement thickness values of 150, 200 and 250mm, if the centre to centre spacing between the two tyres = 270mm, clear gap between the wall of the tyres = 110mm **(06 Marks)**

Module-4

7 a. With a neat sketch, explain the method of determining the aggregate- bituminous mixes proportioning by Rothfuch's method. **(08 Marks)**

b. List the explain the various construction steps in the WMM base construction. **(06 Marks)**

c. What do you understand by Tack coat and Prime coat? List the various objectives of providing these in pavements. **(06 Marks)**

OR

8 a. Explain the various steps in the construction of Dense bituminous macadam pavement. **(10 Marks)**

b. Step by step, explain in detail, construction of Dry Lean Concrete sub base course. **(10 Marks)**

Module-5

9 a. List the objects of
   i) Surface drainage
   ii) Sub surface drainage of roads. **(06 Marks)**

b. What are various cross drainage structure? Explain each one of those. **(05 Marks)**

c. What do you understand by
   i) Lowering of water table
   ii) Control of seepage flow
   iii) Control of capillary rise.
   Explain with neat sketches. **(09 Marks)**

OR

10 a. Compare the annual costs of a 2 lane road for two types of pavement structures
   i) WBM with thin bituminous surface at a total cost of Rs 100 lakhs per km, life of 10 years, interest at 10%, with a salvage value of Rs 2.50 lakhs after 10 years, and annual average maintenance cost of Rs 5 lakhs/km
   ii) Bituminous macadam base and bituminous concrete surface, with a total cost of Rs 200 lakhs/km, life of 15 years, interest at a rate of 8%, salvage value of 3.50 lakhs at the end of 15 years, with annual average maintenance cost Rs 7.5 lakhs/km. Comment which one is more economical? **(08 Marks)**

b. What is Public Private Partnership? How it will help the Road projects in India? Explain. **(06 Marks)**

c. What are the various advantages and disadvantages of Benefit cost ratio method? Explain the method with formulae. **(06 Marks)**

* * * * *

USN | | | | | | | | | | |

17CV/CT51

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Design of RC Structural Elements

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS 456-2000 and SP-16 is permitted.

Module-1

1　a. Explain balanced section, over reinforced section and under reinforced section. **(06 Marks)**
　b. Derive the expression for limiting steel and find limiting percentage steel for M20 concrete and Fe415 steel. **(06 Marks)**
　c. A doubly reinforced rectangular beam 250 × 550mm reinforced with 4-22mm diameter in tension 2-16mm diameter in compression E cover 50mm E span 12m Fe 415 steel. Check the deflection using modification factors. **(08 Marks)**

OR

2　a. Explain working stress method and limit state method of design. **(06 Marks)**
　b. Explain the philosophy of structural design. **(06 Marks)**
　c. Derive the expression for stress block parameters of compressive force C and its CG dist $\overline{Y}$. **(08 Marks)**

Module-2

3　a. A singly reinforced beam 250mm × 500mm is reinforced with 4-16mm diameter E-Cover 50mm E span 6m. Determine the central point load that can be applied at mid span adopt M20 concrete Fe 500 steel. **(10 Marks)**
　b. Find the steel for a rectangular section 300mm × 600mm to support a load of 80kN/m E-span 6m E-Cover 50mm adopt M20 concrete Fe 415 steel. **(10 Marks)**

OR

4　a. A doubly reinforced concrete beam 250 × 450mm is reinforced with 4-20mm diameter in comp 6-20mm diameter in tension. Find ultimate moment take E cover 50mm adopt M20 concrete Fe415 steel. **(10 Marks)**
　b. A T beam has a flange width 1200mm flange thickness 100mm E depth 600mm web 300mm. Find steel to support ultimate moment 700kN m adopt M20 concrete Fe510 steel. **(10 Marks)**

Module-3

5　Design a beam having clear span 5m supporting a love load 10kN/m for flexure and shear. Apply the check for deflection and bond. Adopt M20 concrete Fe415 steel. **(20 Marks)**

OR

6　A rectangular beam 250mm × 500mm to support a load 40kN/m including self wt (working load) E-span 5m E-cover 50mm. Design the beam for flexure and shear and apply check for deflection and bond. **(20 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-4

7   Design a two way slab for a room 6m × 4m wall thickness 230mm. All edges discontinuous and corners are held down live load $4kN/m^2$ floor finish $1kN/m^2$ thickness of slab 150mm adopt M20 concrete Fe415 steel.   **(20 Marks)**

OR

8   An open well stair case is to be provided for a stair hall 3.25m × 3.25m. The size of open well at centre 1.25m × 1.25m Floor height 3.6m size of landing at each corner is 1m × 1m thickness of stair wall 230mm. The stair slab is embedded into wall by 200mm live load $3kN/m^2$ design the stair.   **(20 Marks)**

Module-5

9   a.   An axially loaded RCC column un supported length 2.75m has to carry an axial load 2000kN design a square section column.   **(12 Marks)**

   b.   Design a column using SP-16 having a section 300mm × 400mm subjected to ultimate load 1200kN ultimate moment $M_u = 200kN$ m. Take effective cover 50mm. Assume steel on two sides only.   **(08 Marks)**

OR

10   A square column 400mm sides carries a load of 900kN. Design footing SBC of soil $100kN/m^2$ adopt M20 concrete Fe415 steel. Apply the check for one way shear and two way shear and bond. Assume depth of edges 300mm (Isolated footings).   **(20 Marks)**

* * * * *

USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   **17CV52**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Analysis of Indeterminate Structures

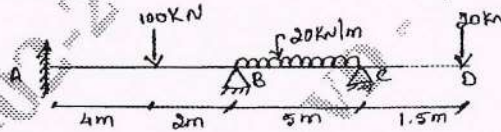Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   Analyze continuous beam shown in Fig. Q1, by Slope deflection method. Draw Bending
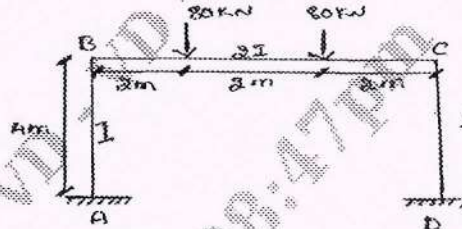   Moment diagram. Take EI constant.   **(20 Marks)**

Fig. Q1

OR

2   Analyze the Portal frame shown in Fig. Q2, by Slope Deflection method. Draw bending moment
    diagram.   **(20 Marks)**

Fig. Q2

Module-2

3   Analyze Continuous beam shown in Fig. Q3, by Moment Distribution method. Draw Bending
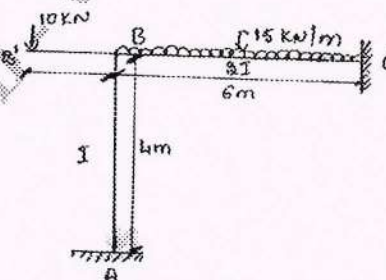   Moment diagram. Take EI constant.   **(20 Marks)**

Fig. Q3

OR

4   Analyze Portal frame shown in Fig. Q4, by Moment Distribution method. Draw Bending
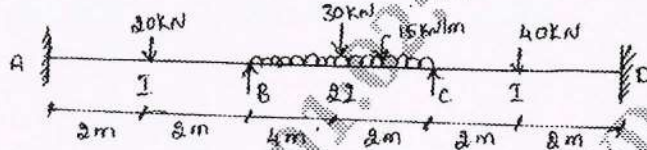   Moment diagram.   **(20 Marks)**

Fig. Q4

1 of 3

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-3

5 Analyze the Continuous beam shown in Fig. Q5, by Kani's method. Draw Bending Moment diagram. **(20 Marks)**

Fig. Q5

OR

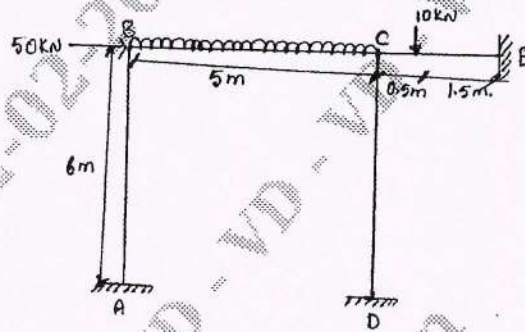**6** Analyze the frame shown in Fig. Q6, by Kani's method. Draw Bending Moment diagram. **(20 Marks)**
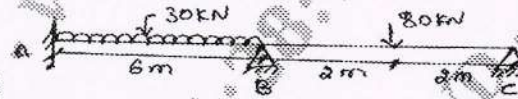
Fig. Q6

Module-4

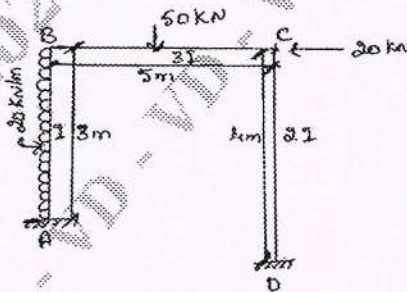**7** Analyze the beam shown in Fig. Q7, by Flexibility Matrix method. Draw Bending Moment diagram. **(20 Marks)**

Fig. Q7

OR

8 Analyze Portal frame shown in Fig. Q8, by Flexibility Matrix method. Draw Bending Moment diagram. **(20 Marks)**
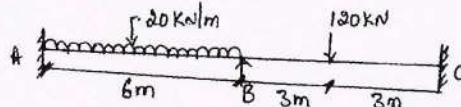
Fig. Q8

Module-5

9 Analyze the beam shown in Fig. Q9, by Stiffness Matrix method. Draw Bending Moment diagram. **(20 Marks)**

Fig. Q9

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

10 Analyze Portal frame shown in Fig. Q10, by Stiffness Matrix method. Draw Bending Moment diagram.

(20 Marks)

Fig. Q10

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

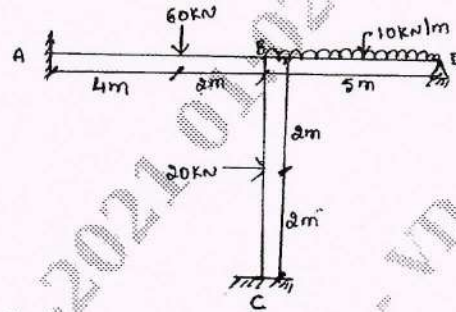USN | | | | | | | | | | 17CV53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Applied Geotechnical Engineering

Time: 3 hrs.   Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS:6403 permitted.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-1

1   a. Enumerate the objectives of soil investigation.   (06 Marks)
    b. Explain the wash boring method of soil exploration with a neat sketch.   (07 Marks)
    c. With a neat sketch of soil sampler, define:
       i) Area ratio   ii) Inside clearance   iii) Outside clearance   iv) Recovery ratio. (07 Marks)

OR

2   a. Distinguish between disturbed, undisturbed and representative samples, for which type of test the samples are suited.   (06 Marks)
    b. What is meant by drainage and dewatering? Explain electro-osmosis method of dewatering. (07 Marks)
    c. Explain the Hvorslev's method of locating the ground water table.   (07 Marks)

Module-2

3   a. Distinguish between Bousinessq and Westergaard's theory of stress distribution.   (06 Marks)
    b. Explain equivalent point load method of determining vertical stress at a point within loaded area.   (07 Marks)
    c. A load of 1000kN acts as a point load at the ground surface. Estimate the stress at a point 2m below and 4m away from the point of action of the load by Bousinenq's formula. Compare with Westergaard's formula.   (07 Marks)

OR

4   a. A concentrated load 1000kN acts at the ground surface. Construct a 25% isobar. (06 Marks)
    b. Explain the construction and use of Newmark's chart.   (07 Marks)
    c. A saturated clay 8m thick underlies a proposed new building. The existing overburden pressure at the centre of clay layer is 300kPa and load due to the new building increases the pressure by 200kPa. The liquid limit of the soil is 75%, water content – 50% and G = 2.7. Estimate the consolidation settlement.   (07 Marks)

Module-3

5   a. Distinguish between active and passive earth pressure. What are the assumptions made in the Rankine's earth pressure theory?   (06 Marks)
    b. Explain the Culmann's graphical method of determining the active Earth pressure. (07 Marks)
    c. A Smooth vertical wall of height 4.5m retains a cohesion less backfill with $\phi = 30°$, void ratio = 0.62 and G = 2.7. If the soil is completely dry, draw the earth pressure distribution on the wall. If the water table rises to the top of the soil, compute the total earth pressure on the wall.   (07 Marks)

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6 a. Explain the causes for a slope failure. Explain with neat sketch the different modes of slope failure. **(06 Marks)**

 b. Explain the method of slices for slope stability analysis. **(07 Marks)**

 c. Calculate the factor of safety with respect to cohesion of clay, the slope laid at 1 in 2 to a length of 11m. If the angle of internal friction $\phi = 10°$, Taylor's stability number is 0.064, $c = 20kN/m^2$ and $\gamma = 19kN/m^2$. Determine the critical height of the slope. Determine the critical height of the slope in this soil. **(07 Marks)**

Module-4

7 a. What are the assumptions made in Terzaghi's theory? Write the expression for ultimate bearing capacity of strip footing, square and circular footing. **(10 Marks)**

 b. The footing of a column $2.5 \times 2.5m$ is founded at a depth of 1.5m on a cohesive soil of unit weight $18kN/m^3$. Take $C = 30kN/m^2$, $\phi = 0$. What is the safe load for this footing? **(10 Marks)**

OR

8 a. With the help of neat sketch, explain the effect of water table on the bearing capacity of soil. **(10 Marks)**

 b. Explain standard penetration test with suitable corrections. How do you access b.c. of shallow footings on sand using SPT test data? **(10 Marks)**

Module-5

9 a. List and explain the classification of piles based on function and material. **(10 Marks)**

 b. A square pile group of 9 piles of 250mm diameter is arranged with a pile spacing of 1m. The length of the pile is 9m. The unit cohesion of clay is $75kN/m^2$. Neglecting bearing at the tip of the piles. Determine the group capacity. Assume adhesion factor of 0.75ϕ. **(10 Marks)**

OR

10 a. Write a note on negative skin friction. **(10 Marks)**

 b. Write a note on under-reamed piles. How can the ultimate load carrying capacity of under-reamed piles can be estimated. **(10 Marks)**

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN

Fifth Semester B.E. Degree Examination, Jan./Feb.2021
Masonry Structures

Time: 3 hrs.   Max. Marks: 100

Note:**1.** *Answer any FIVE full questions, choosing ONE full question from each module.*
     2. *Use of IS-1905-1987 code of practice for structural use of un reinforced masonry' is permitted.*
     3. *Draw self explanatory sketches wherever necessary.*

Module-1

1 a. Explain the field tests and laboratory tests (compression, water absorption, modulus of elasticity, efflorescence) conducted on good building bricks.   **(07 Marks)**
   b. Explain with neat sketches various types of cracks in masonry and suggest remedial measures.   **(07 Marks)**
   c. What are the factors affecting compressive strength of masonry?   **(06 Marks)**

OR

2 a. Explain briefly quality of good building stones.   **(06 Marks)**
   b. Explain various defects and errors in masonry.   **(07 Marks)**
   c. Derive the expression for compressive strength of masonry based on elastic theory.
                                                                                           (07 Marks)

Module-2

3 a. With neat sketches, explain any five type of walls. Discuss effective thickness of such walls.
                                                                                           (06 Marks)
   b. Explain the following design criteria for different type of walls and end conditions :
      (i) Effective thickness   (ii) Effective height   **(07 Marks)**
   c. A solid wall with piers have following details:
      Thickness of wall t_w = 200 mm
      Centre to Centre distance of piers = 3600 mm
      Width of piers (W_p) = 200 mm
      Thickness of piers (t_p) = 400 mm
      Length of wall = 7200 mm
      No openings in the wall and is supported by cross walls at each end.
      Height of wall = 3300 mm
      The wall is fully restrained at top and bottom equivalent eccentricity $(\bar{e})$ = 11.7 mm
      Determine : (i) Effective thickness of wall
                 (ii) Effective length of wall
                 (iii) Effective height of wall
                 (iv) Slenderness ratio
                 (v) Stress reduction factor   **(07 Marks)**

OR

4 a. Explain the importance of following criteria in the design of masonry structure:
      (i) Permissible compressive stress,
      (ii) Stress reduction factor,
      (iii) Area reduction factor,
      (iv) Shape modification factor,
      (v) Increase in permissible compressive stress for eccentric loading.
      (vi) Permissible tensile stress.   **(10 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

b. A cavity wall consists of two leaves 100 mm thick and is separated by a cavity of 50 mm in between. The length of the wall is 5.0 m without any openings. The height of the wall is 3.0 m and the wall is fully restrained at the bottom and partially restrained at the top. It carries an eccentric load whose equivalent eccentricity $(\bar{e})$ = 8.8. Determine

    (i) Effective thickness

    (ii) Effective height

    (iii) Effective length

    (iv) Slenderness ratio

    (v) Stress reduction factor   **(10 Marks)**

Module-3

5 a. Explain the design criterion of walls subjected to uniformly distributed load.   **(04 Marks)**

  b. Design an interior cross-wall of a two storeyed building to carry 150 mm thick RCC slabs with 3 m ceiling height. The wall is fully restrained at top and bottom. It supports a 3.0 m wide slab.

    Live load on roof = 2 kN/m^2

    Live load on floor = 2.5 kN/m^2

    Weight of 80 mm thick terrace = 1.96 kN/m^2

    Weight of floor finish = 0.8 kN/m^2

    Refer Fig. Q5 (b).

Fig. Q5 (b)   **(16 Marks)**

OR

6 a. Explain the procedure of design of walls with openings.   **(04 Marks)**

  b. Design an interior cavity wall for three storeyed building the ceiling height of each storey being 3.0 m. The wall is stiffened by intersecting walls 200 mm thick at 3600 mm centre to centre. Both top and bottom of wall are fully restraint.

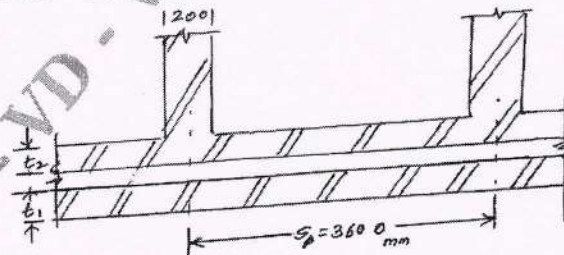   Assume loading from roof = 16 kN/m and from each floor = 12.5 kN/m. Refer Fig. Q6 (b).

Fig. Q6 (b)   **(16 Marks)**

Module-4

7 a. Draw the stress distribution diagrams under eccentric loads for the following conditions:

(i) Eccentricity e = 0   (ii) $0 < e < \dfrac{t}{6}$ (iii) $e = \dfrac{t}{6}$ (iv) $e > \dfrac{t}{6}$ **(06 Marks)**

b. Design an exterior wall with piers under a concentrated load for a workshop building 3.6 m high carrying steel trusses at the top at 4.5 m spacing. The wall is securely tied at the roof and floor levels. The loading is as follows:

(i)   Concentrated reaction from the roof truss = 30 kN acting at the centre of wall.
(ii)   Roof loading = 7 kN/m
(iii) Neglect wind load

Refer Fig. Q7 (b).   **(14 Marks)**

Fig. Q7 (b)

OR

8 a. Explain the design criteria of walls subjected to concentrated axial loads.   **(05 Marks)**

b. Design an external cavity wall of a single storeyed building the inner leaf of which supports an eccentric load of 10 kN/m at an eccentricity of 25 mm. The wall is fully restrained at top and bottom and supports a concrete roof at the top. Height of wall is equal to 4.0 m. Refer Fig. Q8 (b).   **(15 Marks)**
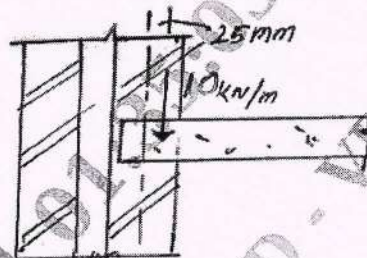

Fig. Q8 (b)

Module-5

9 a. With neat sketches indicating forces acting, explain the stability checks on a retaining wall.   **(06 Marks)**

b. Design a shear wall 5.0 m long and 3 m high to resist a horizontal earth quake force in its plane. Assume the seismic load to be uniformly distributed across the height of wall. Earthquake acceleration = 0.1 g. The wall is tied with metal anchors at the top and bottom supports.   **(14 Marks)**

OR

10 a. With neat sketches, explain different modes of failure of in-filled frames.   **(06 Marks)**

b. Design a compound wall the height of which is 1.8 m from ground level to the top of coping. Assume wind pressure is equal to 1000 N/mm² and is uniformly distributed. The safe bearing pressure on the soil is 120 kN/m². Assume foundation suitably.   **(14 Marks)**

* * * * *

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐   17CV/CT563

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Remote Sensing and GIS

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
     2. *Write neat sketches wherever necessary.*

Module-1

1 a. Define Remote Sensing. Explain the elements involved in Remote Sensing with neat sketch.
                                                                              (10 Marks)
   b. What is Spectral reflectance curve? Explain the different types of spectral reflectance curve with neat sketch.   **(10 Marks)**

OR

2 a. What is electromagnetic spectrum? Explain the Electromagnetic Spectrum with neat sketch.
                                                                              (10 Marks)
   b. What is visual interpretation? Explain tools used in visual interpretation.   **(10 Marks)**

Module-2

3 a. What is Resolution? Describe all sensor Resolution.   **(10 Marks)**
   b. What is Platform in remote sensing? Explain different types.   **(10 Marks)**

OR

4 a. Explain Systematic errors.   **(08 Marks)**
   b. Explain Indian Remote Sensing satellite.   **(12 Marks)**

Module-3

5 a. Define GIS. Describe key components and function of GIS.   **(10 Marks)**
   b. Describe different data types used in GIS.   **(10 Marks)**

OR

6 a. What is map projection? Explain the types of map projection.   **(10 Marks)**
   b. Write a note on spectral data input and Attribute data management.   **(10 Marks)**

Module-4

7 a. What is vector data? Explain vector data model.   **(10 Marks)**
   b. Write a note on : i) Coverage ii) Shape file iii) Data base management system. **(10 Marks)**

OR

8 a. What is Raster data? Explain raster data model and types.   **(10 Marks)**
   b. Explain different raster data structure.   **(10 Marks)**

Module-5

9 a. Explain the following : i) Land use land cover analysis ii) Change detection. **(10 Marks)**
   b. Explain the application of RS and GIS in natural resources management.   **(10 Marks)**

OR

10 a. Explain following ; i) Water Resource   ii) Urban planning.   **(10 Marks)**
   b. Explain the application of location based service.   **(10 Marks)**

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN ☐☐☐☐☐☐☐☐☐☐   **15CV51**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Design of RC Structural Elements

Time: 3 hrs.   Max. Marks: 80

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Use of IS – 456 ,SP16 chart permitted.*
3. *Assume missing data suitably.*

Module-1

1 a. What is Limit state? Explain different limit states to be considered in the design of RC beams. **(06 Marks)**

b. Explain the terms Singly Reinforced and Doubly Reinforced, with neat sketch. **(04 Marks)**

c. What is Stress block? Derive from fundamentals for the area of stress block $0.36f_{ck} \, b \, x_u$ and depth of concrete of compressive force from the extreme fibre in compression $0.42 \, x_u$. **(06 Marks)**

OR

2 a. Briefly explain under reinforced , over reinforced and balanced with neat sketch. **(08 Marks)**

b. A flanged beam of T – section is simply supported over an effective span of 8m. The beam has effective flange width of 1400mm , thickness of flange as 150mm , breadth of web as 300mm and effective depth of 450mm. It is reinforced with 4 bars of 25mm diameter in tension and 3 bars of 16mm diameter in compression. Check the beam for deflection. Use M20 and Fe 415 sheets. **(08 Marks)**

Module-2

3 a. A RCC beam of section 330mm × 500mm is reinforced with 3 – bars of 20mm diameter with an effective cover 50mm. The beam is simply supported over a span of 5m. Find maximum permissible UDL on the beam. Use M20 grade concrete and Fe 500 steel. **(08 Marks)**

b. Design a rectangular beam for an effective span of 6m. The superimposed load is 80kN/m and size of the beam is limited to 300mm × 700mm overall with an effective cover 50mm.Use M20 mix and Fe 415 grade steel. **(08 Marks)**

OR

4 a. A RC T – beam having total depth 380mm and width 230mm is cast monolithically with slab 110mm thick. The beam is simply supported over a span of 4.44m and spaced 3m c/c. Concrete mix M20 and steel of grade Fe 500 have been used. Calculate the maximum UDL. The beam can carry and the corresponding steel. **(10 Marks)**

b. A RC beam 230mm wide and 450mm deep is reinforced with 3nos of #16mm bars of grade Fe415, on the tension side, with an effective cover of 50mm. Ultimate design shear force is 80kN. Design the shear reinforcement. **(06 Marks)**

Module-3

5 A rectangular beam is to be simply supported on supports of 300mm width. The clear span of the beam is 6m. The beam is to have width of 230mm. The characteristic superimposed load is 12kN/m. Using M_{20} and Fe500 steel, design the beam and sketch details of reinforcement. **(16 Marks)**

OR

6 Design a rectangular beam of section 300mm and 500mm over all. Effective span 6m and effective cover for reinforcement should be kept as 50mm. Superimposed load on the beam is 40kN/m. Use M_{20} concrete and Fe415 steel. Sketch details of reinforcement. **(16 Marks)**

Module-4

7 a. Distinguish between one way slab and two way slab. **(04 Marks)**
  b. Design a continuous R.C. slab for a class room 7 in wide and 17.5m long. The roof is to be supported on RCC beams spaced at 3.5m intervals. The width should be kept 300mm. The super imposed load is $3kN/m^2$ and finishing load is $1kN/m^2$. Use M_{20} concrete and Fe 500 steel. Show reinforcement details. **(12 Marks)**

OR

8 a. Design a R.C slab for a room measuring 6.5m × 5.0m. The slabs is to be cast monolithically over the beams with corners held down. The width of the supporting beam is 230mm. The slab carries superimposed load of $5kN/m^2$. Use M_{20} grade concrete and steel grade Fe500. Sketch details of reinforcement. **(08 Marks)**
  b. Design a dog – legged stair for a building in which the vertical distance between floor is 3.6m. The stair hall measures 2.5m × 5.0m. the live load may be taken as $2.5kN/m^2$. Use M_{20} concrete and Fe 415 steel bars. **(08 Marks)**

Module-5

9 a. Explain the following : i) Pedestal   ii) Short column   iii) Long column. **(03 Marks)**
  b. What are the assumptions made in the limit state of Collapse – compression? **(04 Marks)**
  c. Design the reinforcement for a short axially load square column of size 450mm × 450mm to support a load of 1500kN and Fe500 steel. **(09 Marks)**

OR

10 A rectangular column 400mm × 600mm carries and live load of 2kN. The SBC of soil is $150kN/m^2$. Using M_{20} concrete and Fe415 steel. Design a rectangular footing to support the column. Sketch the details of reinforcement. **(16 Marks)**

* * * * *

2 of 2

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Analysis of Indeterminate Structures

Time: 3 hrs.   Max. Marks: 80

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume missing data suitably.*

Module-1

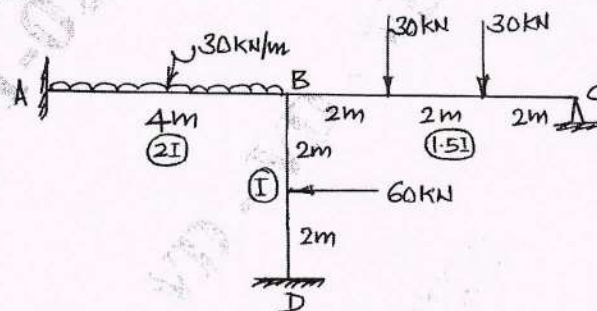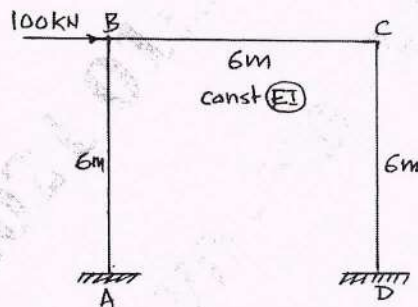1   Analyze the frame shown in Fig.Q1. Using slope deflection method. Also draw BMD and sketch the elastic curve.

Fig.Q1   **(16 Marks)**

OR

2   Analyze the frame shown in Fig.Q2. Using slope deflection method. Also draw BMD and sketch the elastic curve.

Fig.Q2   **(16 Marks)**

Module-2

3   Analyze the frame shown in Fig.Q3 by the method of Moment Distribution. Draw BMD, SFD and also sketch the elastic curve.

Fig.Q3   **(16 Marks)**

1 of 3

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

4 Analyze the continuous beam shown in Fig.Q4 by the method of moment distribution. Draw BMD, SFD and also sketch the elastic curve.
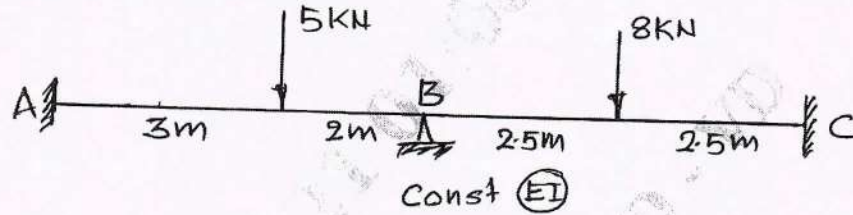

Fig.Q4

(16 Marks)

Module-3

5 Analyze the frame shown in Fig.Q5 by using Kani's method. Draw BMD and also sketch the elastic curve.
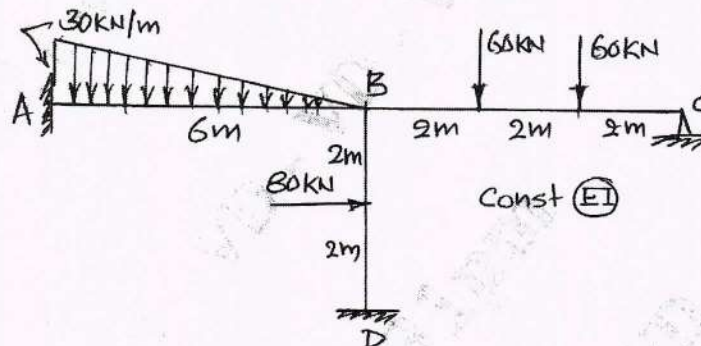

Fig.Q5

(16 Marks)

OR

6 Determine the support moments for the continuous beam shown in Fig.Q6 by Kani's method. The relative I values are indicated along the member in each span. E is constant. Draw BMD and elastic curve.
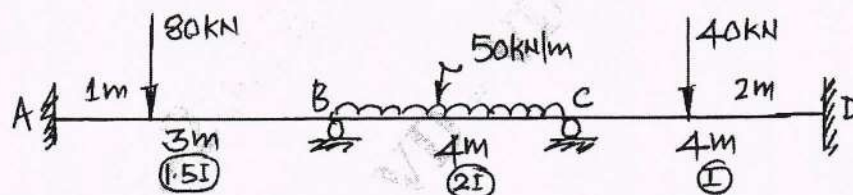

Fig.Q6

(16 Marks)

Module-4

7 Analyze the continuous beam shown in Fig.Q7 by flexibility matrix method. Take EI constant throughout. Draw BMD.
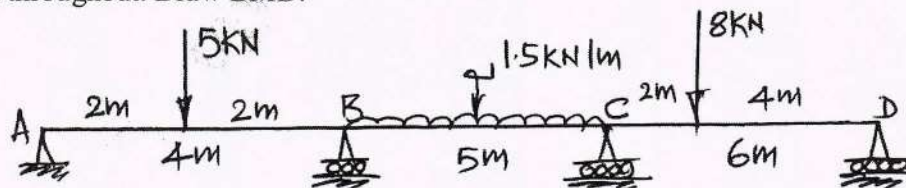

Fig.Q7

(16 Marks)

2 of 3

OR

8   Analyze the truss shown in Fig.Q8 by flexibility matrix method. Choosing the force in member AD as redundant. Assume AE as constant for all members.
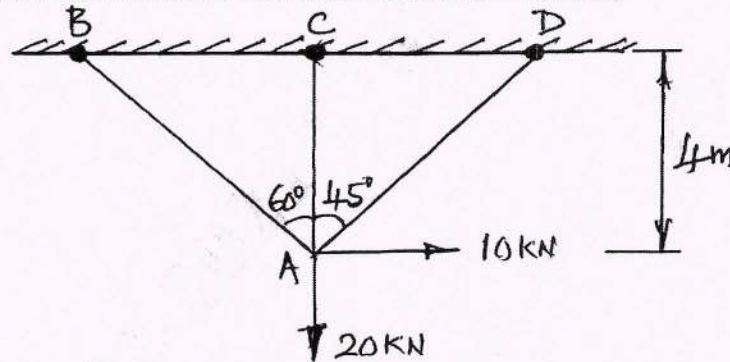

Fig.Q8   (16 Marks)

Module-5

9   Analyze the continuous beam shown in Fig.Q9 by stiffness method, using system approach. Draw BMD, SFD and elastic curve. Supports A and C are fixed ends.
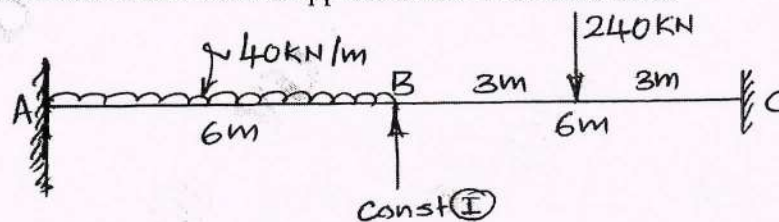

Fig.Q9   (16 Marks)

OR

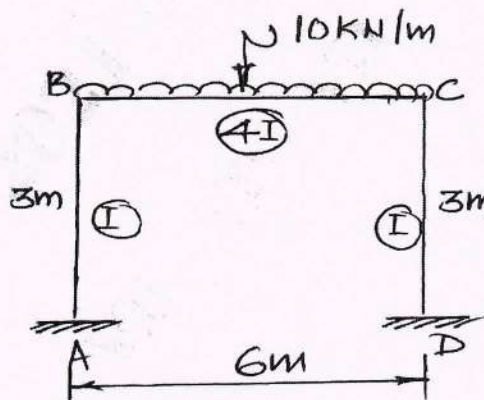10   Analyze the rigid jointed plane frame shown in Fig.Q10 by stiffness matrix method. Draw BMD.

Fig.Q10   (16 Marks)

* * * * *

USN ☐☐☐☐☐☐☐☐☐☐   **15CV53**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Applied Geotechnical Engineering

Time: 3 hrs.   Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data, if any, may be suitably assumed.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1   a. List the methods of soil exploration. With a neat sketch explain seismic refraction method.
        (08 Marks)
    b. A sampling tube has inner diameters of 70mm and cutting edge diameter of 68mm. Its outside diameter are 72mm and 74mm respectively. Determine the area ratio, inside clearance and outside clearance of the sampler. This tube is pushed at the bottom of the borehole to a distance of 550mm with length of sample recorded being 530mm. Find recovery ratio.
        (08 Marks)

OR

2   a. List the methods of dewatering employed in field and with a neat sketch explain multi-stage well point system.
        (08 Marks)
    b. Estimate the position of the ground water table from the following data obtained from the field :
        i)   Depth upto which water is bailed out   = 30m
        ii)   Raise is water level on First day   = 2.2m
        iii) Raise in water level on Second day   = 1.8m
        iv)   Raise is water level on Third day   = 1.5m.
        (08 Marks)

Module-2

3   a. Compare Bousinesq's and Westergaard's analysis. Also state their limitations.   **(08 Marks)**
    b. Find the intensity of vertical pressure and horizontal shear stress at a point 4m directly below a 20kN point load acting at a horizontal ground surface. What will be the vertical pressure and shear stress at a point 2m horizontally away from the axis of loading but at the same depth of 4m?
        (08 Marks)

OR

4   a. Explain the terms immediate settlement, consolidation settlement, secondary settlement differential settlement and uniform settlement.
        (10 Marks)
    b. Estimate the immediate settlement of a footing of size 2m × 3m resting at a depth of 2m is a sandy soil whose compression modulus is $10N/mm^2$ and the footing is expected to transmit a unit pressure of 160 kN/m^2. Assume $\mu = 0.28$ and $I_f = 1.06$.
        (06 Marks)

Module-3

5   a. With neat sketches explain types of earth pressure.   **(08 Marks)**
    b. A retaining wall of 8m height retains sandy material. The properties of sand are e = 0.6, $\phi = 30°$ and G = 2.65. The water table is at a depth of 2.5m from the ground surface. Draw the earth pressure diagram and determine the intensity of earth pressure at the base of the retaining wall.
        (08 Marks)

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

OR

6 a. List causes of slope failure and with neat sketches explain types of slope failures. **(08 Marks)**

b. A 5m deep canal has side slopes of 1 : 1. The properties of soil are $C_u = 20kN/m^2$, $Q_u = 10°$, $e = 0.8$, and $G = 2.8$. If Taylor's stability number is 0.108 determine the factor of safety with respect to cohesion when the canal runs full. Also find the same in case of draw down, if the stability numbers for this condition is 0.137. **(08 Marks)**

Module-4

7 a. With a neat sketch explain standard penetration test. **(08 Marks)**

b. Determine the safe bearing capacity of square footing 2.1 width placed at a depth of 1.5m in a soil with saturated unit weight of 17 kN/m³, $C = 15$ kN/m², $\phi = 20°$, $N_C = 11.8$, $N_q = 3.9$ and $N_r = 1.7$. What is the change in bearing capacity, if the water table raises to 0.5m above the base of the footing? Assume factor of safety as 3. (Take unit weight of soil as 17kN/m³ for all cases). **(08 Marks)**

OR

8 a. With neat sketches explain types of shallow foundations. **(10 Marks)**

b. A square footing located at a depth of 1.3m below ground has to carry a safe load of 800kN. Find the size of footing if the desired factor of safety is 3. Use Terzagh's analysis for general shear failure. Take $C = 8$ KPa, $N_c = 37.2$, $N_q = 22.5$ and $N_r = 19.7$. **(06 Marks)**

Module-5

9 a. Explain the classification of piles based on load transfer and function. **(08 Marks)**

b. In a 16 pile group, the pile diameter is 45cm and centre to centre spacing of the piles is 1.5m. If $C = 50$ kN/m², determine whether the failure would occur with the pile acting individually or as a group? Neglect bearing at the tip of the pile. All piles are 10m long. Take $M = 0.7$. **(08 Marks)**

OR

10 a. With a neat sketch explain negative skin friction. **(08 Marks)**

b. A pile group of 9 piles, 10m long is used as a foundation for a bridge pier. The piles used are 30cm diameter with centre to centre spacing of 0.9m. The sub soil consists of clay with unconfined compressive strength of 1.5kg/cm². Determine the efficiency neglecting bearing action. Take adhesion factor as 0.9. **(08 Marks)**

* * * * *

USN ☐☐☐☐☐☐☐☐☐☐ **15CV553**

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Masonry Structures

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS 1905-1987 "code of practice for structural use of unreinforced masonry" is permitted.

Module-1

1 a. Briefly explain various factors influencing the strength of masonry. **(10 Marks)**
   b. Briefly explain classification of mortar. **(06 Marks)**

OR

2 a. Derive compressive strength of brick unit using elastic theory. **(10 Marks)**
   b. Discuss different types of classification of bricks. **(06 Marks)**

Module-2

3 Design an interior wall of a two storey building to carry 100 mm thick RCC slab with 3.0 m ceiling height. The wall is unstiffened and it supports a 2.65 m wide slab. Live load on the roof = 1.5 kN/m², live load on floor = 2.0 kN/m². Weight of terrace = 1.96 kN/m². Weight of floor finish = 0.8 kN/m². **(16 Marks)**

OR

4 An interior solid cross wall of a two storey building is 100 mm thick with a ceiling height of 3.0 m. It is constructed with a brick of compressive strength of 10 N/mm² and M1 type mortar is used. The walls are fully restrained both at top and bottom. Determine:
   (i) Effective thickness (ii) Effective height (iii) Slenderness ratio
   (iv) Stress reduction factor for e = 0 (v) Permissible compressive stress **(16 Marks)**

Module-3

5 a. Explain the steps involved in the design of axially loaded solid wall. **(06 Marks)**
   b. Design an interior wall of a single storeyed workshop of height 5.4 m supporting a RCC roof. The bottom of the wall rests over a foundation block. Assume roof load = 45 kN/m [refer Fig.Q5(b)]
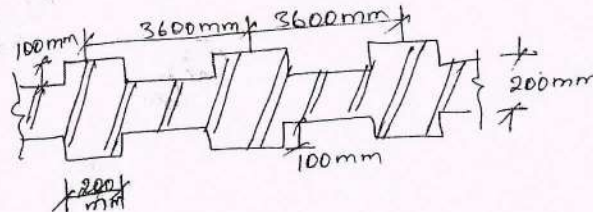

Fig.Q5(b) **(10 Marks)**

OR

6 a. Explain the design criteria involved in the design of masonry. **(06 Marks)**
   b. Design an exterior wall of a workshop building 3.6 m high carrying steel truss at 4.5 m spacing. The wall is secured tied at the roof and floor level. The concentrated reaction from the roof truss is 30 kN at the centre of the wall. Roof loading = 7 kN/m. Ignore wind load. **(10 Marks)**

Module-4

7   Design an interior cross wall AB of a storeyed building, supporting unequal concrete roof slab. The plan is shown in Fig.Q7. Assume triangular bearing pressure and loading as 10 kN/m². The storey height is 3.8 m and the wall is fixed to foundation block below.
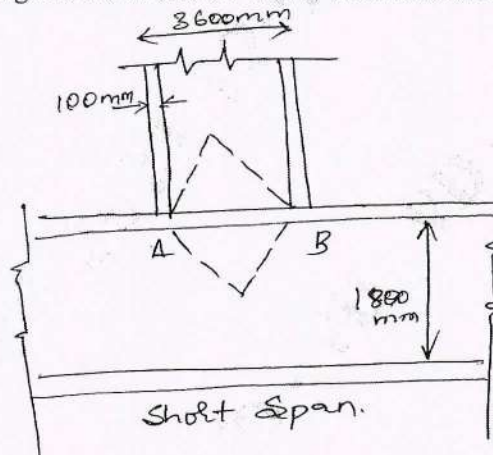

Fig.Q7   (16 Marks)

OR

8   Design an external wall of a single storeyed building, the inner leaf of which supports an eccentric load of 7 kN/m at an eccentricity of 25 mm as shown in Fig.Q8. The wall is an unstiffened, one which supports a concrete roof at the top and rests over a foundation block. Height of the wall is equal to 4.0 m.
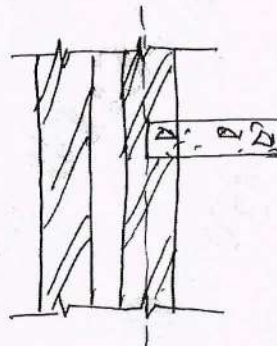

Fig.Q8   (16 Marks)

Module-5

9 a. Briefly explain the steps involved to design free standing wall.   (06 Marks)
   b. Design an exterior wall of a single storey warehouse of 3.5 m height. The loading on the wall consist of vertical load of 25 kN/m from the roof and wind pressure of 860 N/m². The wall is tied with metal anchor at the floor and roof levels.   (10 Marks)

OR

10 a. With a neat sketch, mention different types of In-filled frames.   (06 Marks)
   b. Explain different modes of failures in In-filled frame.   (10 Marks)

* * * * *

CBCS SCHEME

USN | | | | | | | | | | 15CV561

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Traffic Engineering

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume missing data, if any suitably.

Module-1

1 a. Describe the different static characteristics of vehicles that effect road design and traffic performance. **(08 Marks)**
   b. Enumerate the urban traffic problems in India. **(04 Marks)**
   c. Explain modal integration. **(04 Marks)**

OR

2 a. A passenger car weighing 10kN is required to accelerate at a rate of 2 m/sec^2 in the first gear from a speed of 10kmph to 20kmph. The gradient is +2 percent and the road has a WBM surface in good condition. Frontal projection of the area of car is 2.15m^2. Car tyres have radius of 0.33m. The rear axle gear ratio is 3.82:1 and the first gear ratio is 2.78:1. Calculate the engine horse power needed and the speed of the engine. Make suitable assumptions. Coefficient of air resistance = 0.39, coefficient of rolling resistance = 0.025, tyre deformation factor = 0.945, transmission efficiency = 0.90. **(08 Marks)**
   b. Explain briefly sustainable approach of land use and transport related to traffic planning. **(08 Marks)**

Module-2

3 a. What is 30th highest hourly volume? Explain its importance with a neat sketch. **(08 Marks)**
   b. The table below gives the consolidated data of spot speed studies on a section of a road. Determine the most preferred speed at which maximum proportion of vehicles travels.

Speed range kmph	No. of speed observations	Speed range kmph	No. of speed observations
0-10	0	50-60	216
10-20	11	60-70	68
20-30	30	70-80	24
30-40	105	80-90	0
40-50	233		

(08 Marks)

OR

4 a. A vehicle of weigh 2.0 tonne. Skids through a distance equal to 40m before colliding with another parked vehicle of weight 1.0 tonne. After collision both the vehicle skids through a distance equal to 12m before stopping. Compute the initial speed of the moving vehicle. Assume average coefficient of friction as 0.50. **(06 Marks)**
   b. Explain various forms of presenting O and D data. **(06 Marks)**
   c. List the objectives of carrying out parking studies. **(04 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-3

5 a. Briefly explain the design factors of rotary intersection with neat sketch. **(08 Marks)**

    b. Mention the various measures adopted to increase the safety of pedestrians. **(08 Marks)**

OR

6 a. Write a short note on the following:
      i)   Signal coordination
      ii)   Road markings. **(08 Marks)**

    b. What is channelization? Briefly explain the purpose of channelization. **(08 Marks)**

Module-4

7 a. Briefly explain the effect of traffic noise on the environment. **(08 Marks)**

    b. Explain the various characteristics considered in judging the efficiency of a transport mode. **(08 Marks)**

OR

8 a. Explain the different measures adopted to control air pollution created by road traffic. **(08 Marks)**

    b. Explain how to promote non-motorized transport in a country, indicating its advantages. **(08 Marks)**

Module-5

9 a. Define intelligent transport system. Brief out its application in traffic engineering field. **(08 Marks)**

    b. What do you mean by "area traffic control"? Mention its objectives, indicating the types of methods adopted in traffic control. **(08 Marks)**

OR

10 Define transportation system management. Mention the various well-known traffic management measures. Explain any two traffic management measures in detail. **(16 Marks)**

* * * * *

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐   **15CV563**

Fifth Semester B.E. Degree Examination, Jan./Feb.2021
Remote Sensing and GIS

Time: 3 hrs.   Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is remote sensing? What are the principles involved in remote sensing technique?
                                                           (06 Marks)
   b. List out the advantages and limitations of remote sensing technique.   **(10 Marks)**

OR

2 a. Explain the elements of remote sensing system.   **(06 Marks)**
   b. Define resolution. Explain the types of resolution in remote sensing.   **(04 Marks)**
   c. With a neat sketch, explain the interaction of EMR, with Earth's surface.   **(06 Marks)**

Module-2

3 a. Define sensor. Explain the significant characteristics of a sensor.   **(10 Marks)**
   b. Write a note on LandSat, ENVISAT, Cartosat.   **(06 Marks)**

OR

4 a. What is a platform? Explain the different categories of Remote Sensing Platforms. **(08 Marks)**
   b. Explain systematic and non-systematic errors in Remote Sensing.   **(08 Marks)**

Module-3

5 a. Describe GIS. Explain the components of GIS.   **(08 Marks)**
   b. Explain briefly map projections and its types.   **(08 Marks)**

OR

6 a. Define GIS. Explain briefly about GIS operations and its types.   **(08 Marks)**
   b. Write a note on geographic co-ordinated system and projected co-ordinate system. **(08 Marks)**

Module-4

7 a. What is a vector data? Mention the advantages and dis-advantages of vector data. **(08 Marks)**
   b. Explain the types of Raster data.   **(08 Marks)**

OR

8 a. What is a Raster data? Write the advantages and disadvantages of Raster data. **(08 Marks)**
   b. Describe topology and its importance in GIS and mention its applications.   **(08 Marks)**

Module-5

9 a. What is land use/ land cover? Mention the application of remote sensing in land use/ land cover analysis.   **(08 Marks)**
   b. Write a note on change detection and application of remote sensing in water resources.
                                                          (08 Marks)

OR

10 a. Write a note on applications of "R.S and GIS" in natural resources.   **(08 Marks)**
    b. Explain the following urban planning traffic management.   **(08 Marks)**

* * * * *

USN ☐☐☐☐☐☐☐☐☐☐   15CV661

Sixth Semester B.E. Degree Examination, Jan./Feb. 2021
Water Resources Management

Time: 3 hrs.   Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define Hydrological cycle with a neat sketch and explain different process in hydrological cycle. **(08 Marks)**
   b. Explain Global water resources and Indian water resources. **(08 Marks)**

OR

2 a. Explain Water balance equation. Mention its importance. **(08 Marks)**
   b. Explain Groundwater resources. Differentiate between confined aquifer and unconfined aquifer. **(08 Marks)**

Module-2

3 a. Describe the necessity of water resources planning and management. **(08 Marks)**
   b. Explain System Components. Describe the planning scale of water resource management. **(08 Marks)**

OR

4 a. Explain the water resource planning and management analysis. **(08 Marks)**
   b. Describe the planning and management aspects. Discuss the post planning and management issues. **(08 Marks)**

Module-3

5 a. Define IWRM. Describe the principles of IWRM. **(08 Marks)**
   b. Explain the implementation of IWRM. **(08 Marks)**

OR

6 a. Describe the Legislative and Organizational framework of IWRM along with assessment. **(08 Marks)**
   b. Describe the types and forms of private sector involvement. **(08 Marks)**

Module-4

7 a. Explain Legal framework of water. **(08 Marks)**
   b. Explain National water laws and other key issues. **(08 Marks)**

OR

8 a. Describe Irrigation Management transfer policies and activities. **(08 Marks)**
   b. Explain Origin of WUA's and its Byelaws. **(08 Marks)**

Module-5

9 a. Explain Water harvesting techniques. Discuss the necessity of water harvesting. **(08 Marks)**
   b. Describe the design of small harvesting structure like farm ponds (layout & design). **(08 Marks)**

OR

10 a. Explain Micro catchment water harvesting. Mention advantages of micro catchments. **(08 Marks)**
    b. Describe the various rainwater harvesting techniques. **(08 Marks)**

* * * * *

USN | | | | | | | | | | **15CV62**

Sixth Semester B.E. Degree Examination, Jan./Feb. 2021
Design of Steel Structural Elements

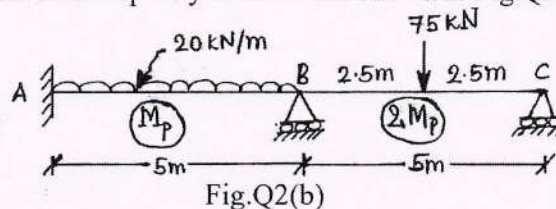Time: 3 hrs.   Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS:800-2007 and SP:6(1)-1964 or steel table is permitted.

Module-1

1 a. Mention any four advantages and four disadvantages of steel structures. **(08 Marks)**
   b. Briefly explain the different loads used in the steel structural design and also the combinations of loads. **(08 Marks)**

OR

2 a. Determine the shape factor of a rectangular section of breadth 'b' and depth 'd'. **(06 Marks)**
   b. Determine the plastic moment capacity of the beam shown in Fig.Q2(b).

Fig.Q2(b)   **(10 Marks)**

Module-2

3 a. Write a short note on HSFG bolt. **(04 Marks)**
   b. Two plates 10 mm and 18 mm thick are to be jointed by double cover butt joint. Design the joint for the following data:
   (i)   Factored design load = 750 kN
   (ii) Bolt diameter = 20 mm
   (iii) Grade of steel = Fe410
   (iv) Grade of bolts = 4.6
   (v)   Cover plates 2 (one on each side) = 8 mm thick **(12 Marks)**

OR

4 a. A tie member of a truss consists of double angle section, each 80 mm × 80 mm × 8 mm welded on the opposite side of a 12 mm thick gusset plate as shown in Fig.Q4(a). Design a fillet weld for making connection in the workshop. The tensile force in the member is 400 kN.
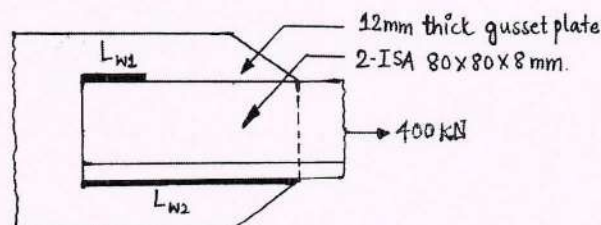

Fig.Q4(a)   **(12 Marks)**
   b. What are advantages of welded connections over bolted connections? **(04 Marks)**

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-3

5 a. Explain the possible failure modes of an axially load column. **(04 Marks)**

   b. Determine the design axial load on the column section ISMB 350, given that the height of the column is 3.0 m and both ends are hinged. Given $f_y = 250$ N/mm^2, $f_u = 410$ N/mm^2, $E = 2 \times 10^5$ N/mm^2. **(12 Marks)**

OR

6 Design a 8m long built-up laced column to carry a factored axial load of 1250 kN. The column is restrained in position but not in direction at each end. Provide a single lacing system making connections with 16 mm diameter bolts. The column shall consists of two channels placed toe to toe at a suitable spacing. **(16 Marks)**

Module-4

7 Design a single angle section to carry a factored tensile force of 200 kN. Bolts of 20 mm diameter are to be provided for the connection of the member to the gusset plate. Take $f_y = 250$ N/mm^2, $f_u = 410$ N/mm^2. The design strength of a 20 mm diameter bolt = 45.3 kN. **(16 Marks)**

OR

8 Design a bolted gusseted base which consist of a column of ISHB 200@ 40 kg/m along with a cover plate on both sides carrying a factored load of 2500 kN. The grade of concrete is M20 and SBC of soil is 220 kN/m^2. **(16 Marks)**

Module-5

9 Design a simply supported beam of span 5m carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The uniformly distributed load is made up of 20 kN/m imposed load and 20 kN/m dead load. The section is stiff against bearing. Assume Fe 410 grade steel. **(16 Marks)**

OR

10 Design a simply supported beam of span 3m. The beam is subjected to a factored bending moment of 250 kN-m and factored shear force of 120 kN. The beam is laterally unsupported. **(16 Marks)**

* * * * *

USN ☐☐☐☐☐☐☐☐☐☐ 15CV64

Sixth Semester B.E. Degree Examination, Jan./Feb. 2021
Water Supply and Treatment Engineering

Time: 3 hrs. Max. Marks: 80

Note : 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume any missing data suitably.*

Module-1

1 a. Write the needs of protected water supply. (04 Marks)
  b. Explain various types of water demands. (06 Marks)
  c. Explain the factors affecting per capita demand. (06 Marks)

OR

2 a. Mention the methods of forecasting population and explain any two of them. (08 Marks)
  b. Write the factors considered for the design period. (04 Marks)
  c. Compare the population of the year 2000 and 2006 for a city whose population in the year 1930 was 25000 and in the year 1970 was 47000 by Geometric Increase method. (04 Marks)

Module-2

3 a. Write the objectives of water treatment. (04 Marks)
  b. With the help of treatment flow chart, write the significance of each unit. (08 Marks)
  c. Write the sources and characteristics of surface sources and subsurface sources of water with regard to quality and quantity. (04 Marks)

OR

4 a. Define Sampling of water and explain methods of sampling. (08 Marks)
  b. Write the BIS for following water quality parameters and write their significance :
     i) Nitrate ii) Fluoride iii) Iron iv) E - Coli. (08 Marks)

Module-3

5 a. Briefly explain types of settling or sedimentation. (06 Marks)
  b. Define Coagulation and Flocculation in water treatment process. (04 Marks)
  c. The maximum daily demand at a water treatment plant was 12 million liter per day. Design the dimensions of a suitable rectangular sedimentation tank for the raw supplies, assuming detention time of 6 hours and velocity of flow as 20cm per minute. (06 Marks)

OR

6 a. Explain four mechanism of filteration used in filteration of water. (06 Marks)
  b. With the help of sketch, explain working of Rapid Sand gravity filter. (06 Marks)
  c. Design a Rapid sand filter unit without under drainage system for 4 MLD of water supply by assuming 4% of filtered water is required for washing of filter every day. (04 Marks)

Module-4

7 a. Define softening of water. Explain Lime soda process and Zeolite process of water softening with equation. (08 Marks)
  b. Explain the following process : i) Reverse osmosis ii) Nano - filteration. (08 Marks)

OR

8 a. Explain different methods of disinfection with their merits and demerits. **(08 Marks)**

   b. Define Fluoridation and Defluoridation design of water and explain the Nalgonda technique of Defluoridation process. **(08 Marks)**

Module-5

9 a. Write the function of intake structures and write the factors governing the location of intake. **(08 Marks)**

   b. With the help of neat sketch, explain twin well type of River intake structure. **(08 Marks)**

OR

10 a. Explain Economical diameter of Raising mains. **(04 Marks)**

    b. Water has to be supplied to a town with one lakh population at a rate of 150 Lpcd from a river 2000m away. The difference in elevation between the lowest water level in the sump and the reservoir is 36mt. If the demand has to be supplied in 8 hours, determine the size of the main and the BHP of the pump required. Assume maximum demand as 1.5 times the average demand. Assume $f = 0.0075$, Velocity in the pipe 2.4m/sec and efficiency of pump 80 percent. **(06 Marks)**

    c. Briefly explain different methods of Distribution of water. **(06 Marks)**

* * * * *

2 of 2