Civil 4th/ Lib.

Roll No. ..... Total Pages : 4

# 44171

**BT-4/J-25**

ENGINEERING MECHANICS

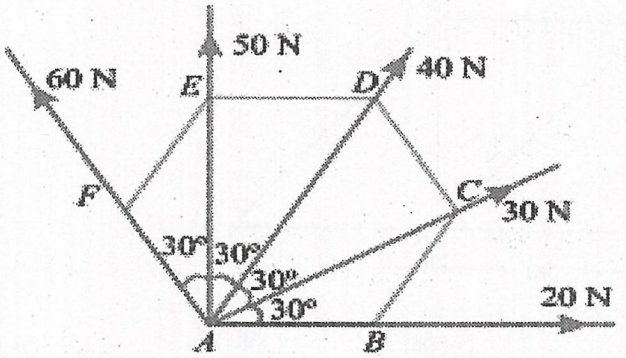
Paper : ES–205–A

Time : Three Hours] [Maximum Marks : 75

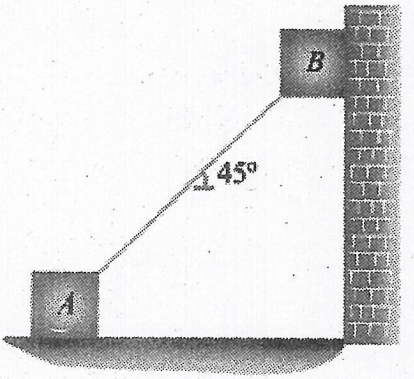
**Note :** Attempt any *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

## UNIT–I

**1.** The forces 20N, 30N, 40N, 50N and 60N are acting at one of the angular points of a regular hexagon, towards the other five angular points, taken in order as shown in figure. Find the magnitude and direction of the resultant force.



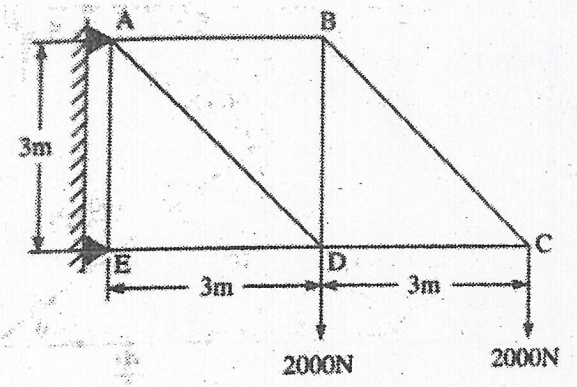
2. Two identical blocks of weight W are supported by a rod inclined at 45° with the horizontal as shown in figure.



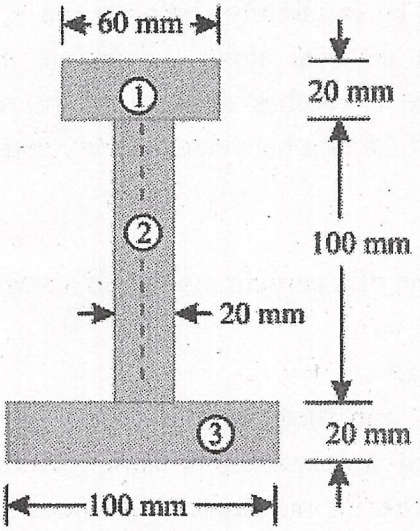

If both the blocks are in limiting equilibrium, find the coefficient of friction ($\mu$), assuming it to be same at floor as well as at wall.

## UNIT–II

3. Determine the forces in all the members of the truss as shown in figure.

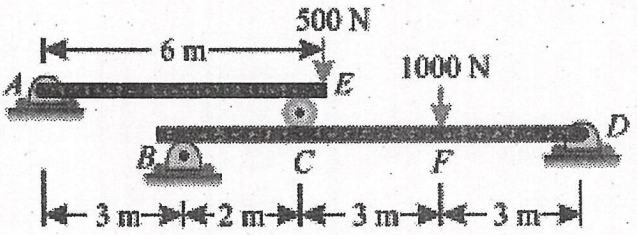


4. An I-section is made up of three rectangles as shown in Figure. Find the moment of inertia of the section about the horizontal axis passing through the centre of gravity of the section.




## UNIT–III

5. Two beams AE and BD are supported on rollers at B and C as shown in Figure.




Determine the reactions at the rollers B and C, using the method of virtual work.

6. Explain principle of virtual work and its write application of principal of virtual work in case of lifting machines.

## UNIT–IV

7. A body of mass 200 kg is initially stationary on a 15° inclined plane. What distance along the incline must the body slide before it reaches a speed of 10 m/s? Take the coefficient of friction between the body and the plane as 0.1.

8. The equation of motion of a particle moving in a straight line is given by :

$$s = 18t + 3t^2 - 2t^3$$

where (s) is in metres and (t) in seconds.
Find (1) velocity and acceleration at start, (2) time, when the particle reaches its maximum velocity, and (3) maximum velocity of the particle.

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Roll No. ..... Total Pages : 3

**44172**

**BT-4/J-25**

STRUCTURAL ANALYSIS–I

Paper : CE-202A

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt any *five* questions in all Selecting at least *one* question from each unit.

**UNIT–I**

1. A Thin rod of circular section radius r, is bent into a quadrant of a circle of radius R. One end of the rod is Encastered vertically . If from the other end a load of W is suspended , determine the vertical & Horizontal deflections of this end due to bending of the rod. (15)

2. The Semicircle ring AB of radius r lying in a horizontal plane, fixed at the end A and free at other end B, is subjected to vertical load at the free end B. Find.
   (a) Vertical deflection at B.
   (b) Angle of Rotation of the tangent to the ring at B.
   (c) Angle of Twist at B.

   Consider the strain energy stored due to bending and twisting and ignored the strain energy stored due to Shear. (15)

## UNIT–II

3. A Symmetrical Portal frame ABCD consist of column AB & CD, all member have length of 5m. Column AB consist a couple of 20KNm clockwise at its center and column CD consist a couple of 20KNm anticlockwise at its center. Column AB & CD are fixed at A & D point. Analyse the portal Frame by Moment Distribution Method. (15)

4. A two Span Beam ABC is fixed at A, continuous over the support B and hinged at C, AB = 8m and BC = 4m. Find the Couple must be applied at B to cause a rotation of one radian at B. Take E = 200KN/mm2 and I = 8×105 mm4. Analyse the Beam by Slope deflection Method. (15)

## UNIT–III

5. A Symmetrical Portal frame ABCD consist of column AB & CD of 4m long, and the beam BC 2m long . The frame consist a point Load of 60KN at the midpoint of the beam. Find the moments A,B,C & D if both end are fixed. Assume uniform Flexural Rigidity. (15)

6. A two hinged parabolic arch of span L and rise h carries a triangular load covering a distance a from left end, Intensity varying uniformly from zero to w. Obtain an expression for horizontal Thrust. (15)

## UNIT–IV

7. Locate the Position of Shear Center for C type Channel Section having total depth of 700mm , width of flange 180mm and thickness of web & flange is 20mm each. (15)

8. The two Hinged Stiffening Girder of a suspension bridge has a span of 120m and cable has a dip of 12m. The depth of Section of Girder is 4.75m. Find the maximum Temperature in the girder due to fall in temperature of 18 Degree Celsius. Take a = $12\times^{10\text{-}6}$ Per Degree Celsius and E = 200KN/mm2. (15)

Roll No. ..... Total Pages : 3

**44173**

**BT-4/J-25**

DESIGN OF STEEL STRUCTURE–I

Paper : CE-204 A

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt any *five* questions, selecting at least *one* question from each unit. All questions are of equal marks. Suitably assume missing data if any. The use of IS 800 and steel tables is allowed.

**UNIT–I**

**1.** (a) Determine shape factor for symmetric I-sections. Also, calculate the moment of resistance of the cross-section given below :
Flange c/s = 100 mm × 10 mm
Web c/s = 200 mm × 10 mm

(b) What do you understand by the strength of a riveted joint?

**2.** (a) List the different modes of failures of a tension member.

(b) A tie member used as a diagonal in a roof truss consists of two angles 75×50×8 mm placed back-to-back on the same side of the gusset plate. The rivets are 18 mm in diameter, provided in one row and the angles are tack riveted. Determine the tensile strength of the member. Take $f_y$ = 250 N/mm$^2$.

## UNIT–II

3. Design a built-up column composed of two channel sections placed back-to-back carrying an axial load of 1500 kN. The effective length of the column is 5.95 m. Also, design single lacing system for the above column. Take $f_y = 250$ N/mm$^2$.

4. (a) Enumerate various types of column bases.

   (b) Design a slab base for a column ISMB 300 subjected to an axial load of 900 kN and a bending moment of 20 kN-m about the major axis. The base plate rests on the concrete of grade M30 and the bearing capacity of the soil is 500 kN/m$^2$.

## UNIT–III

5. (a) Explain web crippling and diagonal buckling briefly.

   (b) A beam of an effective span of 6m carries a UDL of 20 kN/m with concentrated loads of 10 kN each at one-third points of the span. The depth of the beam is limited to 300 mm. Design the beam with additional plates to the flanges. Assume that the beam is laterally supported throughout.

6. Calculate the moment carrying capacity of a laterally unrestrained ISMB 400 member of length 3 m. Apply necessary checks.

## UNIT–IV

7. Design a gantry girder to carry an overhead crane, having the following data :
Spacing of gantry = 6 m, Crane capacity = 200 kN, Distance between entries of gantry girder = 16 m, Weight of the crane girder = 120 kN, Weight of the crab = 50 kN, Minimum approach of crane hook = 1.02 m, Distance between centers of wheels = 3.8 m, Height of the rail section = 80 mm, Mass of rail section = 30 kg/m. Take $f_y = 250$ N/mm$^2$.

8. Design the maximum section of a plate girder for a bridge, for a live load of 50 kN/m and dead load of 30 kN/m. The girder is simply supported over an effective span of 10 m. Take $F_y = 250$ N/mm$^2$ and $E = 2 \times 10^5$N/mm$^2$.

Roll No. ..... Total Pages : 3

**44174**

**BT-4/J-25**

SOIL MECHANICS

Paper : CE-206-A

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt any *five* questions, selecting at least *one* question from each unit. All questions are of equal marks. Suitably assume missing data if any.

## UNIT–I

**1.** Describe briefly :

(a) Darcy's law and its validity.

(b) Atterberg limits and their physical significance.

(c) Uniformity co-efficient and co-efficient of curvature.

**2.** (a) Determine the relative density of saturated sand deposit having a moisture content of 25%, if the maximum and minimum void ratios of sand are 0.95 and 0.45 respectively and the specific gravity of sand particles is 2.6.

(b) Describe in detail how the coarse and fine-grained soils are classified as per I.S. Sketch the I.S. plasticity chart to explain.

## UNIT–II

3. (a) What is quick-sand condition? Derive an expression for the hydraulic gradient required to create quick-sand conditions in a sample of sand.

   (b) What are the properties and utilities of flownet?

4. (a) How are various types of soil compacted in the field?

   (b) The following results were obtained from a standard compaction test on a sample of soil :

| Water content (%) | Mass of wet soil (kg) |
|---|---|
| 0.12 | 1.68 |
| 0.14 | 1.85 |
| 0.16 | 1.91 |
| 0.18 | 1.87 |
| 0.20 | 1.87 |
| 0.22 | 1.85 |

The volume of the mould used was 950 ml. Make necessary calculations and obtain the maximum dry density and the optimum water content. Also, calculate the theoretical maximum dry density.

## UNIT–III

5. (a) How can we determine the vertical stress below loaded areas? Discuss briefly various methods.

   (b) Compare Boussinesq's equation and Westergaard's analysis for vertical stress distribution. Also, discuss the assumptions for both cases.

6. (a) Describe one method of determining Cv, the coefficient of consolidation of soil.

(b) What do you understand by N.C. and O.C. clays?

## UNIT–IV

7. Describe in detail the various Triaxial Shear strength tests based on drainage conditions.

8. (a) A wall with a smooth vertical back 8 m high supports a purely cohesive soil ($\phi = 0$) with C = 0.4 kg/cm$^2$ and bulk density = 1.6 g/cm$^3$. Draw Rankine's E.P. diagram and the position of zero pressure.

(b) Discuss briefly Coulomb's earth pressure theory.

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Roll No. ..... Total Pages : 3

# 44175

**BT-4/J-25**

## HYDRAULICS ENGINEERING

Paper : CE-208A

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit.

### UNIT–I

**1.** Derive the Hagen-Poiseuille law for laminar flow through a circular pipe. Explain its significance in fluid mechanics. 15

**2.** (a) Discuss the differences between smooth and rough pipe flow. 7

(b) A pipe 50 mm in diameter is 6 m long, and the velocity of the flow of water in the pipe is 2.4 m/s. What loss of head and the corresponding power would be saved if the central 2 m length of pipe were replaced by a 75 mm diameter pipe, the change of section being sudden? Take f = 0.04 for the pipes of both diameters. 8

## UNIT–II

3. (a) Explain the development of drag on a flat plate held perpendicular to the flow direction with a neat sketch. 8

   (b) A submarine, which may be supposed to approximate a cylinder 3 m in diameter and 15 m long, travels submerged at 1.54 m/s in sea water at 4°C. Find the drag exerted on it. Take $\upsilon$ for sea water at 4°C as $1.67 \times 10^{-6}$ and density as 1025 kg/m$^3$. Also, find the drag coefficient. 7

4. What is a hydraulic jump in a rectangular channel? Explain its significance and the energy dissipation involved. 15

## UNIT–III

5. Define Mach number and explain its significance in distinguishing between subsonic and supersonic flows. Provide examples of practical applications. 15

6. (a) Differentiate between the isothermal and adiabatic processes with an example. 7

   (b) A test plane is described as having attained a flight speed af Ma = 2 at an altitude of 16 km, where the temperature is approximately –56.6°C (or 216.55°K). Assuming k = 1.4 and R = 287 J/kg.K. Determine the speed of the airplane. 8

## UNIT–IV

7. Explain the working principle of a centrifugal pump and differentiate between static head and manometric head. 15

8. Classify turbines based on head and specific speed, and describe the components and working of a Pelton wheel turbine. 15

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Roll No. ..... Total Pages : 2

**44215**

**BT-4/J-25**

UNIVERSAL HUMAN VALUES – II :

Understanding Harmony

Paper : HTM-901A

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

## UNIT–I

**1.** Explain the basic guidelines for value education. Discuss the need for it in technical and other professional institutions. List any three implications of value education and explain how they are related to your life. (15)

**2.** What are the basic human aspirations and what are the requirements to fulfill them? Indicate their correct priority? Support your answer with two examples. Also discuss the program for continuity of happiness. (15)

## UNIT–II

**3.** Human being is the coexistence of the self and the body. What are the three specific distinguished attributes of the self and body? Explain with examples. (15)

4. Define self regulation and health? How are the two related? "Relationship is between self (I) and another self (I). Examine this statement. (15)

## UNIT–III

5. The minimum content of respect is to be able to see the other person as being similar to you. On what basis is the other similar? Explain the complete content of respect. (15)

6. Distinguish between reaction and response with the clarity of feeling of trust. Give an example of each for a particular case of relationship. How does one develop right feelings- is it on the basis of right understanding or on the basis of events? Explain. (15)

## UNIT–IV

7. Units in nature, other than human beings without right understanding, are interconnected in a relation of mutual fulfillment. Examine this statement with few examples. With the clarity of natural characteristics how would you interact with units of each of the four orders? (15)

8. What is the meaning of 'Universal Human Order'. What is its scope and how is the family order related to it? Differentiate between education and Sanskar. Why they are first human goal. (15)

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Civil 6th/Lib.

Roll No. ..... Total Pages : 04

**BT-6/J-25** **46188**

# DESIGN OF STEEL STRUCTURE-II

Time : Three Hours] [Maximum Marks : 75

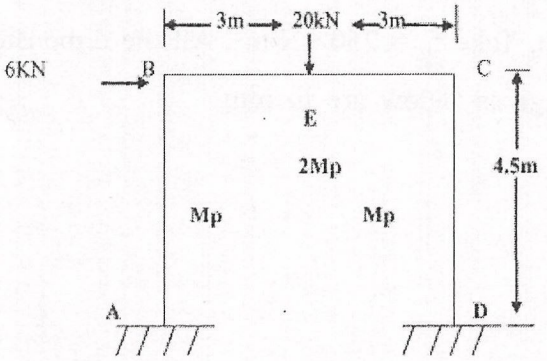
**Note** : Attempt *Five* questions in all, selecting at least *one* question from each Unit. If necessary, assume suitable data and specify the same. Use of IS : 800 (2007) and Steel table are allowed.

## Unit I

**1.** (a) Explain the Conditions and Basic Theorems of Plastic Analysis.

(b) A beam of rectangular cross section b X d is subjected to a bending moment 0.9 Mp. Find out the depth of elastic core.

**2.** Find the value of Mp for the portal & loaded up to Collapse as shown in the figure.






## Unit II

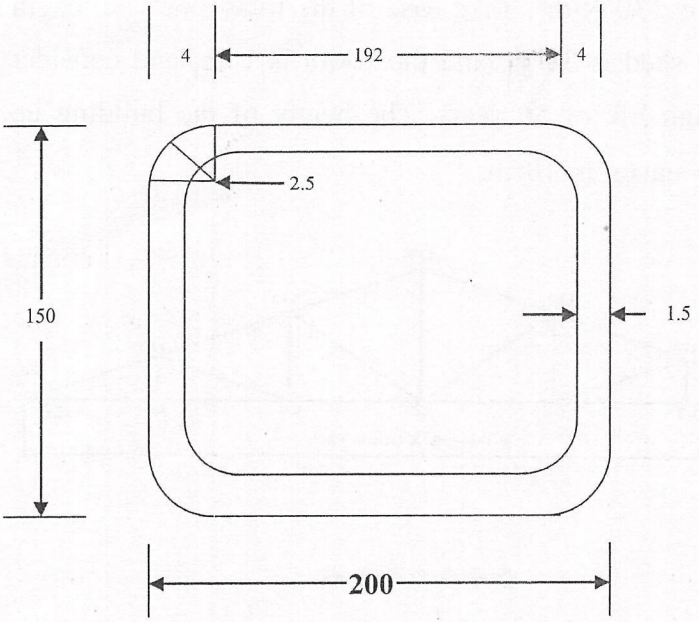
3. Design a Square pressed steel tank of size 5 m × 5 m × 2.5 m High. The Height of the columns above the ground is 12 m. Take basic wind pressure intensity is 1.5KN/$m^2$.

4. A Self-Supporting Chimney is of effective height equal to 30 m, having its diameter at the top equal to 2 m. Design the chimney, taking a uniform wind pressure intensity of 1.5 KN/$m^2$ throughout the height. Assume a uniform value of permissible tensile and compressive stress as 120N/$m^2$ & 90 N/$m^2$.

## Unit III

5. Explain the Transmission Line tower in detail. Also, define the Load on the Tower with the Foundation for the tower. **15**

6. Find the allowable axial load for a column section as shown in the figure. The effective length of the column is 3.6m. Take $f_y$ = 250 kN/$m^2$. All the dimensions in the figure given below are in mm.

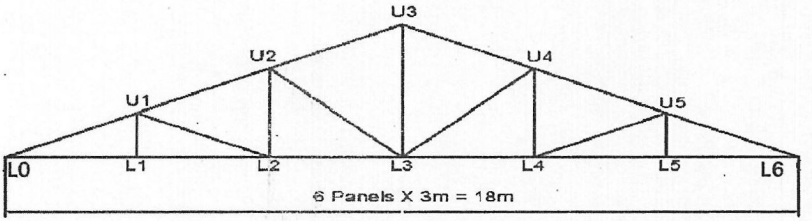



## Unit IV

7. Design a Purlin Supporting G.I sheet of an industrial building having a span of 18 m and a length of 55 m. The Dead load is 0.25 KN/$m^2$ and Live Load is 0.75 KN/$m^2$. Use a rise of 7 m and a spacing.

8. Determine the design forces and design the members LoU1, U1L1, L0L1 of a truss where access is not provided, and it is located in the city of Nashik. Assume the c/c spacing of the truss is 4 m. Assume self-weight of purlin

120 $N/m^2$, weight of bracing 80$N/m^2$, and weight of sheet is 130 $N/m^2$. Take Rise of the truss 3m. The length of the shed is 38 m, and the width is 18m, and consider a design life of 50 years. The height of the building up to the eaves is 10 m.



Roll No. ..... Total Pages : 03

BT-6/J-25 **46189**

# TRANSPORTATION ENGINEERING
## CE-304A

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Suitably assume missing data if any.

### Unit I

1. (a) What are the factors controlling the alignment of new roads ?
   (b) What are the surveys carried out for a new Highway project ?

2. Describe briefly the following :
   (a) O&D studies
   (b) Warning signs
   (c) Thirtieth highest hourly volume.

### Unit II

3. Differentiate between flexible and rigid pavements. Describe the functions of various layers in a flexible pavement.

4. (a) What are the warping stresses ? Explain it with a neat sketch of how warping stresses vary with daily temperature.

(b) What are the critical positions of loading in rigid pavements ? Give the step-by-step design procedure for the design of rigid pavements.

## Unit III

5. What is overtaking sight distance ? Derive an expression for the overtaking sight distance. Give the IRC specifications for the overtaking zones.

6. (a) What is super elevation ? What is the necessity of providing extra width of highway pavement on curves ?

(b) A falling gradient of 1 in 80 meets a rising gradient of 1 in 60 on a highway with a design speed of 80 kmph. Calculate the length of the vertical curve. Assume any data suitably.

## Unit IV

7. List desirable properties of aggregates to be used in road construction. Also, explain the various tests conducted to determine the strength of aggregates for road construction.

8. (a) Differentiate between the following :

(i) Bitumen and Tar

(ii) Cutback and Emulsion.

(b) Specify the materials required for the construction of WBM roads. What are the uses and limitations of WBM roads ?

Roll No. ..... Total Pages : 03

# BT-6/J-25 46190

# IRRIGATION ENGINEERING

## CE-306A

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. Assume any data if necessary.

### Unit I

**1.** (a) What do you understand by term irrigation ? What are the advantages of Irrigation ? 7

(b) The gross commanded area for a distributary is 6000 hectares, 80% of which is culturable irrigable. The intensity of irrigation for rabi season is 50% and that for kharif season is 25%. If the average duty at the head of the distributory is 2000 heactares/ cumec for rabi season and 900 heactares/cumec for Kharif season, Find out the outlet discharge required at the head of the distributory from average demand considerations. 8

2. Explain the terms of Duty and Delta. Also derive a relationship between these two. What are the factors which affect the duty ? **15**

## Unit II

3. What are the various types of irrigation systems ? Describe in details there relative merits and demerits ? **15**

4. Write short notes on some following terms : **15**
   (a) Irigation efficiency
   (b) Micro Irrigation
   (c) Subsurface irrigation
   (d) Consumptive use
   (e) Field Capacity.

## Unit III

5. (a) Explain the balancing depth of canal. Derive an expression for the same. **7**
   (b) Prepare layout plan of a diversion canal headworks, indicating different component parts. **8**

6. Design a regime channel for a discharge of 40 cumecs and silt factor 1.1, using Lacey's Theory ? **15**

## Unit IV

7. What are the various types of losses in canal irrigation system ? also describe the methods of water optimization in canal irrigation system ? 15

8. With the help of simulation model explain how water distribution system can be optimized ? What are factors the need to be taken into considerations for optimizing water distribution system ? 15

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Roll No. ..... Total Pages : 02

# BT-6/J-25 46191

# SOFT SKILL AND INTERPERSONAL COMMUNICATION

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

## Unit I

1. Define Communication. What are the different types of communication ? Explain with examples.

2. What is the role of effective Communication ? Which steps are taken in business communication process ?

## Unit II

3. What are the barriers to communication and how to overcome these barriers ?

4. What kind of communication skills are required in today's scenario ? Also explain the significance of listening and speaking skills.

## Unit III

5. What are the components of personality development ? Describe its role and importance with example.

6. Write down the causes and effects of stress at workplace and how individuals manage their stress ?

## Unit IV

7. Describe the different forms of Group discussion. What are the main strategies for Group discussion ?

8. Explain the following :

   (a) Oral presentation and its mode of delivery.

   (b) Job Interview.

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Roll No. ..... Total Pages : 02

BT-6/J-25 46196

# ENGINEERING GEOLOGY

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

## Unit I

1. (a) Define Geology. Explain its scope and importance in Civil Engineering. 7

   (b) Describe the internal structure of the Earth with a neat diagram. 8

2. Discuss the geological work of water, wind and ice in shaping the Earth's surface. 15

## Unit II

3. Define minerals and rocks. How are minerals classified based on their physical and chemical properties ? 15

4. What are the general principles of stratigraphy in India ? Describe the characteristics of major stratigraphic divisions. 15

## Unit III

5. What are the preliminary geological investigations required for civil engineering projects ? How are geological maps and reports used in such investigations ? 15

6. Discuss, how geological conditions affect the selection and stability of foundation sites for dams, tunnels, highways and bridges. 15

## Unit IV

7. What is the role of retaining walls in improving foundation stability ? Describe other common treatment methods used in engineering geology. 15

8. Discuss the impact of geological features like floodplains, deltas, waterfalls and lakes on the environment. 15

Roll No. ..... Total Pages : 03

BT-6/J-25 46199

# CONSTRUCTION ENGINEERING AND MANAGEMENT

Time : Three Hours] [Maximum Marks : 75

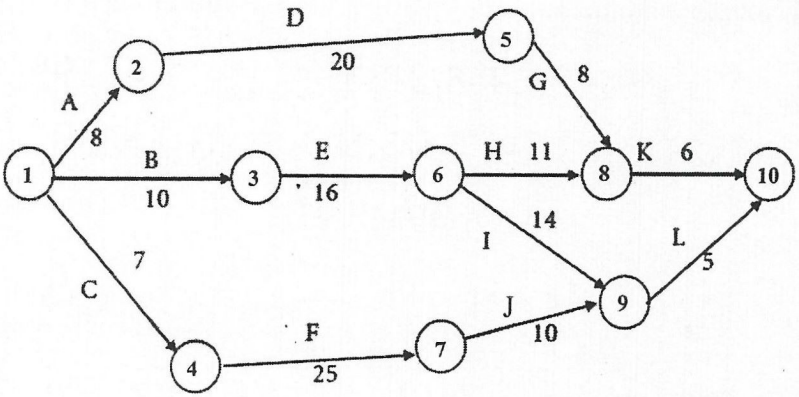
**Note** : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

## Unit I

1. (a) What are the basic steps involved in developing a construction plan ? 7

   (b) How is the work breakdown structure utilized in construction planning ? 8

2. Find the critical path, earliest expected time, latest allowable occurrence time, Slack, earliest start time, earliest finish time, latest start time and latest finish time for the following network diagram. 15




## Unit II

3. (a) Discuss the importance of cost control in construction projects. **7**

   (b) Explain the role of financial accounting systems in managing project budgets. **8**

4. (a) How can project cash flow be controlled effectively ? **8**

   (b) Explain the relationship between schedule updates and budget control. **7**

## Unit III

5. What are the key components of Total Quality Control in construction and how can statistical methods be applied to quality control ? **15**

6. Explain the importance of safety in construction projects and discuss strategies to organize and enforce safety standards on construction sites. **15**

## Unit IV

7. What are the advantages of using computerized systems to organize and manage project information in construction ? Provide examples of their applications. **15**

8. Explain the relational model of databases and its significance in managing construction project information. How does it differ from other conceptual database models ? **15**

Roll No. ..... Total Pages : 02

BT-6/J-25 46201

# DISASTER PREPAREDNESS AND PLANNING

Time : Three Hours] [Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit.

## Unit I

1. (a) Define disaster, hazard, vulnerability and risk. How are these concepts interrelated ? 7

   (b) Differentiate between natural and man-made disasters with suitable examples. 8

2. What are the causes and mitigation measures for earthquakes, floods and tsunami ? 15

## Unit II

3. Describe the different stages in disaster recovery. What are the common challenges faced in each stage ? 15

4. Explain the role and components of an Emergency Management System (EMS). 15

## Unit III

5. Explain briefly the role of NDMA and SDMA in disaster management in India. **15**

6. Explain how Remote Sensing and GIS can be used in disaster management. **15**

## Unit IV

7. How can public infrastructure be planned and designed to be disaster-resilient ? **15**

8. Choose a recent natural disaster in India and describe the key lessons learned from a Civil Engineering perspective. **15**

Civil 8th/Lib.

Roll No. ..... Total Pages : 3

BT-8/J-25 **48321**

# ENGINEERING ECONOMICS, ESTIMATION & COSTING

Paper–CE-402A

Time Allowed : 3 Hours] [Maximum Marks : 75

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

## UNIT–I

1. (a) Describe long wall and short wall method.

   (b) Determine the methods to be adopted to calculate volume.

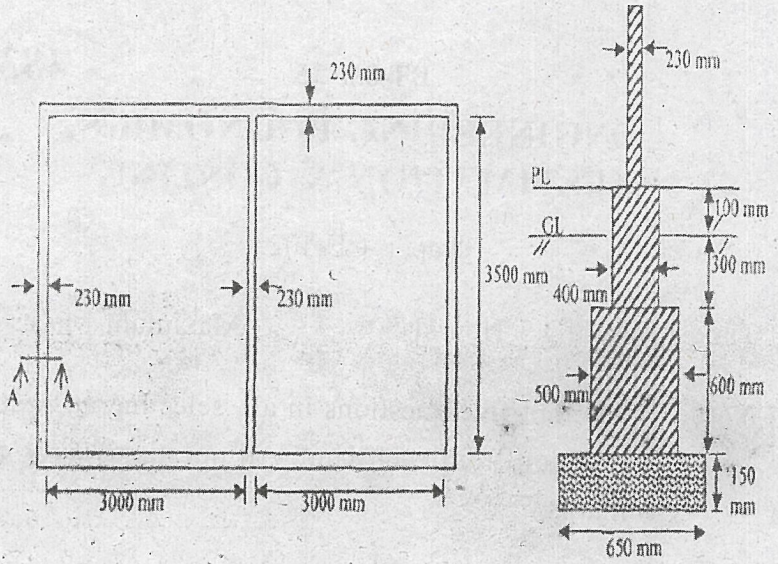
2. The Plan and Sectional elevation of the building are given in Fig. 1 Find the Estimate the quantities for the following items of works.

   (i) Earthwork in Excavation.

   (ii) Plain Cement Concrete for Foundation.

   (iii) Ist Class Brickwork for Foundation.

   Concrete for Roof slab (thickness of slab = 100 mm)




## UNIT–II

3. (a) Differentiate between detailed specification and general specification

   (b) Illustrate a detailed specification of super structure.

4. Write down the detailed specification of the following :

   (a) Cement Concrete in Foundation

   (b) Plastering in Cement Mortar 1:6.

## UNIT–III

5. (a) What do you infer from schedule of rates?

(b) List the conditions which require no deduction or addition in the calculation of wall thickness.

6. Prepare analysis of rate for centering and shuttering for a RCC beam of 60 cm × 30 cm for a span of 8 m. Assume 4.5 m as the height of room.

## UNIT–IV

7. (a) List and explain the different forms of contracts with respect to suitability advantage and disadvantages.

(b) Explain the following :

(i) Lumpsum Contract.

(ii) Lumpsum Contract and Schedule contract.

(iii) Item Rate Contract.

8. (a) Demonstrate the processes "Opening and scrutiny of tender".

(b) Show the general details in Muster roll. and rules for preparation of Muster roll.

Roll No. ..... Total Pages : 3

BT-8/J-25 **48322**

# BRIDGE ENGINEERING

Paper–CE-404A

Time Allowed : 3 Hours] [Maximum Marks : 75

**Note :** Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

## UNIT–I

1. Write a short notes on the following :
   (a) Why Wearing Coat is provided in Bridge slab?
   (b) What is the purpose of Bridge inspection?
   (c) Examine the factors influencing the selection of type of Bridges.

2. (a) Write the specification of class 70 R tracked vehicle loading.
   (b) Differentiate between substructure and superstructure with neat sketches.

## UNIT–II

3. Design the deck slab of a culvert to be located on a State Highway with the following data:
   (i) Width of bridge: 12.0 m

(ii) No footpath provided

(iii) Conditions of exposure: Moderate

(iv Materials:

(a) Concrete grade: M25

(b) Steel: Deformed bars to IS:1786 (Grade Fe 415)

(v) Span = 5.0 m

(vi) Width of slab panel = 3.0 m

(vii) Overall thickness of slab = 1.35 m

(viii) Wearing course: 56 mm thick asphaltic concrete

The design will be made in this section following the current practice for the determination of live load moment.

4. Design a RCC Tee beam girder bridge to suitable the following data :

(i) Clear width of roadway = 7.5 m

(ii) Span (C/C of bearings) = 16 m

(iii) Live load = IRC Class AA loaded vehicle

(iv) Average thickness of wearing coat = 80 mm

(v) Concrete mix. = M 25 grade

(vi) Steel = Fe 415 grade HYSD bars.

## UNIT–III

5. (a) List the various steps involved in the design of balanced Cantilever bridge with neat sketch of the Cross-sectional details.

(b) Draw a neat sketch of Steel Cable stayed Bridge and mark its salient parts.

6. Design a steel longitudinal girder for a Steel concrete composite construction. Thickness of RCC deck slab = 250 mm; effective span = 12·25 m. Centre to center distance of girders = 2·5 m. Consider appropriate live load.

## UNIT–IV

7. (a) Distinguish between Pier and Abutment with reference to Bridge substructure.

(b) List the design loads to be considered in Abutments. Explain the step by step procedure of design of the Abutment.

8. Design a Mild Steel rocker bearing for transmitting superstructure respective load of 1400kN.

(i) Allowable pressure on bearing block : 4MPa

(ii) Permissible Bending stress : 165MPa

(iii) Permissible Bearing stress : 100MPa

(iv) Permissible shear stress : 100MPa

(v) Abed plate of size 500 mm × 1000 mm cable provided.

Roll No. ..... Total Pages : 2

BT–8/J-25 **48325**

# HISTORY OF SCIENCE & ENGINEERING

Paper–OE–410A

Time Allowed : 3 Hours] [Maximum Marks : 75

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

## UNIT–I

1. Explain the Interrelationship between Science, Engineering and Technology. How do they affect each other in the modern world? 15

2. Describe the evolution of Science, Technology and Engineering through Ancient, Medieval and Modern ages with suitable examples. 15

## UNIT–II

3. Discuss the Diversity and Professional distribution of Scientists and Engineers by type of Employer and field of Specialization. 15

4. Explain the current Job placement trends in the Science and Engineering sector. What challenges do new graduates face? 15

## UNIT–III

5. What key attitudes and goals contribute to success in a Science or Engineering classroom? Explain with examples. 15

6. Write a comparative Biography highlighting the achievements and influence Albert Einstein and M. Visvesvaraya. 15

## UNIT–IV

7. What are the different personal problem-solving styles, and how can Individuals improve their approach to problems? 15

8. Differentiate between Analytical and Creative problem-solving approaches with suitable examples. 15

Roll No. ..... Total Pages : 2

BT-8/J-25 **48328**

# EARTHQUAKE ENGINEERING

Paper–EL-422A

Time Allowed : 3 Hours] [Maximum Marks : 75

**Note :** Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

## UNIT–I

1. Explain the theory of plate tectonics and its role in Earthquake generation. 15

2. How are Earthquake magnitudes and Intensities measured, and what is the difference between them? 15

## UNIT–II

3. Explain the concept of response Spectrum and its importance in Seismic design. 15

4. Why is ductility important in the Seismic design of structures? 15

## UNIT–III

5. What are the commonly used techniques for repairing Earthquake-damaged structures? 15

6. What are the criteria for selecting appropriate strengthening methods for a Damaged structure? 15

## UNIT–IV

7. What is base Isolation and how does it enhance earthquake resistance in Buildings? 15

8. How do IS: 4326 and IS: 13920 contribute to Earthquake-resistant construction practices? 15

Roll No. ..... Total Pages : 2

BT–8/J–25 **48331**

# WASTE WATER TREATMENT

Paper–EL–428A

Time Allowed : 3 Hours] [Maximum Marks : 75

**Note :** Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks. Assume any data if necessary.

## UNIT–I

1. Explain the various types of Sewerage System with their advantages and disadvantages in detail. 15

2. (a) For a Wastewater sample, 5 days BOD at 20 degree Celsius is 400mg/L and is 78% of the ultimate. What will be the 4 day BOD at 30 degree Celsius? 7

   (b) Explain the Physical and Biological characteristics of the Sewage in detail. 8

## UNIT–II

3. (a) Describe the self purification of Streams in detail. 8

   (b) Differentiate between the Grit chamber and Detritus Chamber. 7

4. Explain the design of Screen and Sedimentation Tank in detail. 15

## UNIT–III

5. Explain the principle and working of Oxidation Ditch and Oxidation Pond. 15

6. (a) Explain the Biological Process of trickling Filter. 7

   (b) Explain the process of Design of septic tank. 8

## UNIT–IV

7. Write short notes on the following : 3×5=15

   (a) Sludge Drying beds.

   (b) Equalization and proportioning.

   (c) Volume and Strength reduction.

8. (a) Explain the effect of Industrial effluent on Waste water treatment plant. 8

   (b) How we can conserve the Water in stream? 7