**End Semester Examination**

**11th June 2024**

**Program:** UG Final Year Δ-Tech (Civil)

**Course Code:** PC-BT801

**Course Name:** Engineering Economics, Estimation and Costing

**Duration:** 3 Hours

**Maximum Points:** 100

**Semester:** VIII

**Notes:**

- Question 1 is **compulsory**. Attempt **any four** out of remaining six questions
- Assume **suitable data** if necessary and **state it clearly**
- Clearly write units everywhere. Points will be deducted in each place units are missing
- Figure on right indicate **maximum points** for the given question, **course outcomes attained**, and **Bloom's Taxonomy Level**

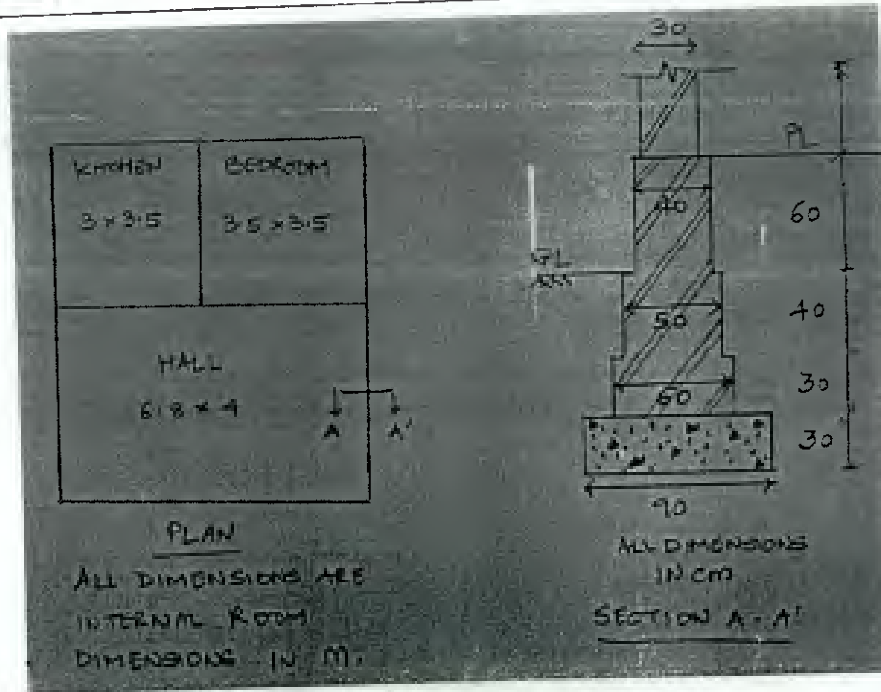| Q. No. | | | Points | CO | BL |
|---|---|---|---|---|---|
| 1 | a | Figure 1 shows the plan and sectional details of a load bearing residential structure. Work out the quantity of brick masonry in foundation up to plinth using <u>centerline method</u> | 10 | 4 | 4 |



**Figure 1**

| | b | What is a negotiated tender? Discuss its advantages and disadvantages | 5 | 5 | 1,2 |
|---|---|---|---|---|---|
| | c | An engineer has two bids for an elevator to be installed in a commercial building. | 5 | 1 | 4 |

The details of the bid are given below. Using present worth analysis and assuming an interest rate of 15% and life of 15 years, determine which bid should be accepted. See equations on page 4.

| Bidder | Capital Investment | Annual Operation and Maintenance Cost |
|---|---|---|
| Alpha | Rs. 4.5 Lakhs | Rs. 27,000/- |
| Beta | Rs. 5.4 Lakhs | Rs. 28,500/- |

| | | | | | |
|---|---|---|---|---|---|
| 2 | a | A trenching machine was purchased for Rs. 4.5 lakhs. Assuming the salvage value to be 10% of purchase cost and useful life to be 8 years calculate the depreciation and book value using declining balance method. | 10 | 3 | 4 |
| | b | Draft specifications for internal painting of a commercial structure | 5 | 4 | 3 |
| | c | Determine the feasibility of the Mumbai Pune missing link project using the benefit to cost ratio concept based on the following data:<br>Investment cost: INR 6695 Cr.<br>Expected daily traffic: 1,00,000 PCU<br>Estimated annual savings per PCU: INR 2500/-<br>Annual maintenance cost: INR 12 Cr.<br>Assume interest rate at 6% and life of road to be 30 years. See equations on page 4. | 5 | 2 | 4 |
| 3 | a | Draft a notice inviting tender for the proposed construction of administrative building for government hospital in Palghar at an estimated cost of Rs.10.2 Crores having a completion time of 8 months. | 10 | 5 | 2 |
| | b | Draw the bar bending schedule for the beam shown in Figure 2. | 10 | 4 | 4 |



**Figure 2**

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | Calculate the earthwork volume using mean sectional area formula. Gradient for chainage 0 to 200 is rising gradient 1:200, for chainage 250 to 500 is falling gradient 1:100. Formation level is 101.50 m at 0 chainage. Formation width is 30 m, side slopes are 1V: 2H in fill and 1V:1.5 H in cut. | 10 | 4 | 3 |

| Chainage (m) | 0 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| G.L. (m) | 100.7 | 100.2 | 98.5 | 101 | 102.5 | 102.8 | 103.5 | 104.1 | 104.3 | 104 | 104.5 |

| | | | | | |
|---|---|---|---|---|---|
| | b | Discuss the importance of Workmen's Compensation Act, 1923 with respect to any construction project | 5 | 5 | 2 |
| | c | What is BIM and how can it be useful for a quantity surveyor? | 5 | 4 | 2 |
| 5 | a | Perform rate analysis for excavation of hard/dense soil for a depth up to 1.5m and lead distance of 50m per 10m$^3$ of earthwork. Capacity of the excavator and dumper is 305 m$^3$ per day. Assume suitable and reasonable rates for material and labour for Mumbai suburban area. Assume labour output constants as per IS7272 as shown in Figure 3 below | 10 | 4 | 3 |

**TABLE 1 RECOMMENDED LABOUR OUTPUT CONSTANTS FOR BUILDING WORK**

| Sl. No. | Description of Work | Unit | Labour | Recommended Constant in Days | Remarks |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| i) Excavation and Earth Works | | | | | |
| | a) Excavation over areas (Hard/dense soil), depth up to 1·5 m and removal (up to one metre from edge) | M$^3$ | Mate<br>Mazdoor | 0·06<br>0·62 | —<br>— |
| | b) Excavation in trenches (Soft/loose soil) for foundations not exceeding 1·5 m in width and for thafu, wells, cesspits and the like, not exceeding 10 m$^2$ on plan, depth up to 1·5 m and removal (up to one metre away from edge) | M$^3$ | Mate<br>Mazdoor | 0·05<br>0·50 | —<br>— |

**Figure 3**

| | | | | | |
|---|---|---|---|---|---|
| | b | Work out an approximate estimate for a G+10 RCC apartment building with the following details if the land cost is Rs. 20 Cr.<br>  i. Plinth area = 300 m$^2$<br>  ii. Cost of construction = Rs.55,000/m$^2$<br>  iii. Assume 15% plinth area for circulation and 8% for walls<br>  iv. 5% for contingencies and 3% for work charged establishments | 10 | 4 | 3 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | v. Include appropriate cost for water supply, sanitation, and electrification. | | | | | | | | | |
| 6 | a | For a project, the cash flow prediction table is given below. Calculate NPV at interest rate of 7% and determine if project should be executed. | | | | | | | 10 | 1 | 4 |

| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Cash Flow in Lakh Rs | -30 | 3 | 4.5 | 7 | 7 | 6.5 | 6 | 5 | 4.5 |

| | | | | | |
|---|---|---|---|---|---|
| | b | What is sensitivity analysis? Discuss its importance in engineering economics. Explain isoquants in detail. | 10 | 2 | 2,3 |
| 7 | a | Discuss the terms book value and obsolescence in the context of a construction-equipment. | 4 | 3 | 1,2 |
| | b | Explain the purpose of preparing an estimate. | 6 | 4 | 3 |
| | c | What are standard specifications? Discuss their advantages | 5 | 4 | 1,3 |
| | d | If a sinking fund of Rs. 12,000/- is set aside annually a period of 18 years at 9% interest, calculate the present value of the equipment. Assume no salvage value. | 5 | 1 | 4 |

Equations:

Single payment present worth factor $= \dfrac{1}{(1+i)^n}$

Equal payment capital recovery factor: $A = \dfrac{i(1+i)^n}{(1+i)^n-1} P$

Single payment compound amount factor $= (1+i)^n$

Equal payment compound amount factor $= \dfrac{(1+i)^n-1}{i}$

Equal payment present worth factor $= \dfrac{(1+i)^n-1}{i(1+i)^n}$

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

## End Semester Examinations June 2024

### (2023-24)

*Final yr*

13/6/24

**Program: B.TECH. (C/M/E)** Sem VIII        **Duration: 03 Hrs.**

**Course Code: OE-BTC-812**        **Maximum Points: 100**

**Course Name: HUMAN RESOURCES DEVELOPMENT & ORGANIZATIONAL BEHAVIOR**

**Semester: VIII (Civil/Mechanical/Electrical Engineering)**

## Notes:

- Attempt *any five* questions.

- Answer to all sub questions should be grouped together.

- **Figure** to right indicates full marks.

- Assume suitable data wherever necessary and state it **clearly**.

| Q. No. | Questions | Points | CO | BL | Module |
|---|---|---|---|---|---|
| **1** | (a)The objectives of human resources developments are to improve the efficiency of employees at workplace using systematic and planned approach. Justify the statement. | 10 | 1 | 1 | 1 |
| | (b) Explain with an example the role of HRD to set the future goals and objectives for the entire organization and for self. | 10 | 1 | 1 | 1 |
| **2** | (a) Highlight the important issue in employee counselling at workplace and discuss employee counselling and assistance programme for employee wellness. | 10 | 2 | 2 | 2 |
| | (b) Organization need people who can bring different perspective and different strengths as the roles demand in an organization for its sustainability. Explain the statement with an examples. | 10 | 2 | 3 | 2 |
| **3** | (a)Explain the competency framework for HRD and steps in competency mapping with an example. | 10 | 1 | 2 | 2 |
| | (b) What is organizational learning theory? Discuss: the role of leadership in organizational learning and career development. | 10 | 2 | 3 | 3 |

Bharatiya Vidya Bhavan's

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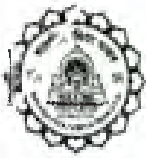
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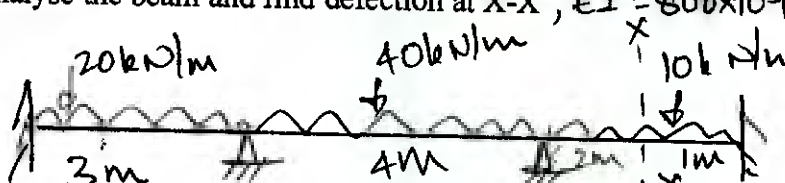
## End Semester Examinations June 2024

### (2023-24)

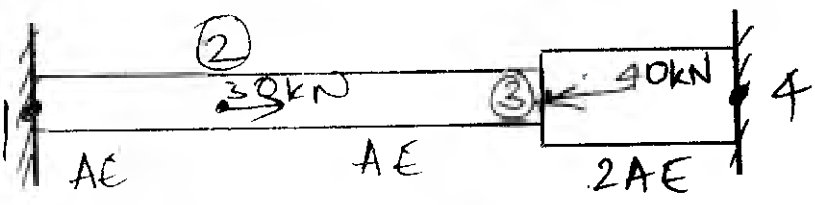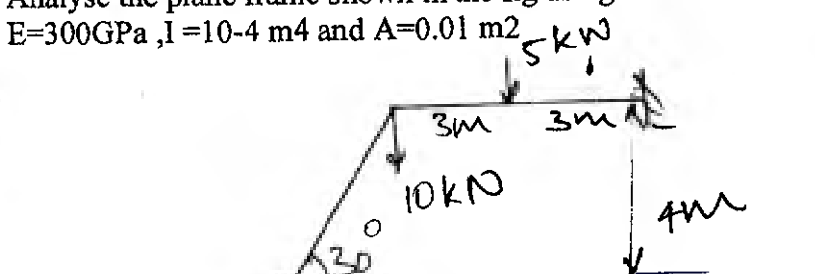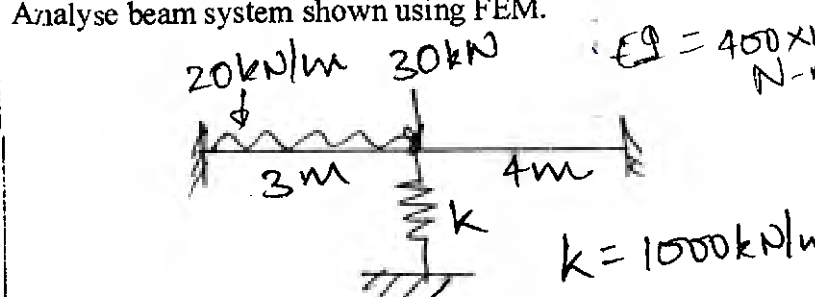| | | | | | |
|---|---|---|---|---|---|
| **4** | (a) Explain career development stages, activities and role of an individual with an example. | 10 | 2 | 4 | 3 |
| | (b) Discuss the top ten job expectations and its role in career planning, development and employee retention. | 10 | 2 | 4 | 3 |
| **5** | (a) Explain the role of HRD in developing ethical attitude and behavior and talent development. | 10 | 2 | 4 | 4 |
| | (b) What is diversity at workplace? How diversity at workplace matters? Discuss its benefits and role HR to manage it. | 10 | 2 | 4 | 5 |
| **6** | (a) Discuss major contributing disciplines to the field of organizational Behavior and importance of understanding organizational behavior. | 10 | 2 | 4 | 5 |
| | (b) Discuss the role of emotions, moods and personality values in the process of improving an organization's effectiveness and member's well-being focusing on both macro (Large Scale)-and micro (Small scale)-levels. | 10 | 2 | 5 | 6 |
| **7** | (a) Explain the motivation concept and work team and discuss how it makes workplace teams more effective. | 10 | 2 | 4 | 6 |
| | (b) What do you mean by "Effective listening"? Discuss the role of communication in conflict resolution and negotiations for organizational change and stress management. | 10 | 2 | 5 | 6/7 |

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# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

## End Sem Exam June 2024

18/6/24

| | |
|---|---|
| **Program:** B.Tech – Civil Engineering | **Duration:** 3 hr |
| **Course Code:** PE –BTC824 | **Maximum Points: 100** |
| **Course Name:** Finite Element Analysis | **Semester: VIII** |

**Notes:**

1. **Attempt any five questions.**

2. **Assume appropriate data wherever required.**

| Q. No. | Questions | Points | CO | BL | Module No. |
|---|---|---|---|---|---|
| 1a | Similarity & differences between the plane stress and plain strain elements. | 05 | 1,2 | 3 | 4 |
| 1b | Derive shape function for four noded rectangular element. | 07 | 1,2 | 3 | 2 |
| 1c | Derive shape functions for eight noded rectangular element using Lagrangian Interpolation function. | 08 | 1 | 3 | 2 |
| 2a | Solve the following differential equation using<br>Galerkins Method<br>Least Square Method<br>Point Collocation Method<br><br>$\Phi'' - \Phi = x$<br>Use Boundary Conditions<br>$\Phi(x=0)=0$ and $\Phi(x=1)=1$ | 15 | 1 | 3 | 1 |
| 2b | Derive shape function for three noded line element. | 05 | 1 | 2 | 4 |
| 3 | Analyse the beam and find defection at X-X , $EI = 800 \times 10^5 N\text{-}m$<br> | 20 | 1,2 | 3 | 5 |
| 4a | Write short notes on shape functions and their uses in finite element analysis | 05 | 1 | 2 | 3 |
| 4b | The triangular element is used for ground water flow simulation. The nodal coordinates are (x1=1, y1=1),(x2=8,y2=0.5) and (x3=4,y3=5). The nodal values of head $\Phi$ at different nodes are {12.5,12.2,12.8} respectively.A point source is located at a point p(x=3.5,y=3.5) whose strength is 0.3m3/min. Distribute the strength of the source proportionaly to the nodes 1,2,3. | 15 | 1,2 | 3 | 3 |

| | | | | | |
|---|---|---|---|---|---|
| 5a | Calculate the field variable x at a point P(s=L/4) for a line element with cubic interpolation function and also its first derivative at the same point ,given that {x}=[2 ,5 ,6 ,7.5] | 6 | 1,2 | 3 | 3 |
| 5b | For the three-bar assemblage shown in figure determine a) Assembled stiffness matrix b) displacement at point x (5 cm right of node 2) c) Reactions at nodes 1 and 4 , $AE = 400 \times 10^7 \ N\text{-}m^2$  | 14 | 1,2 | 3 | 4 |
| 6 | Analyse the plane frame shown in the fig using FEM. Consider E=300GPa ,I =10-4 m4 and A=0.01 m2  | 20 | 1,2 | 3 | 5 |
| 7 | Analyse beam system shown using FEM. $EI = 400 \times 10^5 \ N\text{-}m^2$  $k = 1000 \ kN/m$ | 20 | 1,2 | 3 | 5 |

**END SEM Examinations June 2024**

Program: Civil Engineering

Duration: 3hr

Course Code: PE-BTC853

Maximum Points: 100

Course Name: Valuation & Value Engineering

Semester: VIII

Instructions:

1. Question no. 1 is compulsory
2. Attempt any 4 questions out of remaining 6 questions.
3. Neat diagrams/cash flow diagram must be drawn wherever necessary.
4. Assume Suitable data if necessary and state it clearly.

| Q. No. | | Questions | Points | CO | BL | Module |
|---|---|---|---|---|---|---|
| 1 | a | Discuss the scope of value engineering in case of the design, construction and maintenance of National Highway construction projects. | 7 | CO2 | BL2 | 7 |
| | b | It is proposed to select between two projects X and Y. | 8 | CO3 | BL3 | 5 |
| | | Based on the present worth method and annual worth method select the best project at the interest rate of 10%. | | | | |

| End of year | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Project X | -50,000.00 | 5,000.00 | 17,500.00 | 30,000.00 | 42,500.00 |
| Project Y | -50,000.00 | 40,000.00 | 15,000.00 | 15,000.00 | 15,000.00 |

| Q. No. | | Questions | Points | CO | BL | Module |
|---|---|---|---|---|---|---|
| | c | Differentiate between valuation and value engineering. | 5 | CO1 | BL1 | 1,3 |
| 2 | a | Find the value of the entire plot by belting method of valuation of a land. | 8 | CO1 | BL3 | 2 |
| | | If the width of the first belt is 80 m and its value is estimated as 1800 per sq. m. | | | | |



| Q. No. | | Questions | Points | CO | BL | Module |
|---|---|---|---|---|---|---|
| | b | Clearly explain worth, cost and value. | 6 | CO2 | BL1 | 3 |
| | c | Differentiate <br> (i) Estimation and valuation <br> (ii) Depreciation & obsolescence | 6 | CO1 | BL1 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | a | Explain different method of valuation of a property. | 8 | CO1 | BL2 | 2 |
| | b | A manufacturing company purchases materials worth ₹ 50 lakhs. | 6 | CO3 | BL3 | 5 |
| 3, | | Calculate the present worth of material purchase for a 5 year period, if the material price follows a geometric pattern with<br>(a) g= -5%, (b) g= 0% and (c) g=+5% .The interest rate can be assumed to be 10 %.<br>(b) | | | | |
| | c | Discuss the value engineering saving potential along with the benefits of value management. | 6 | CO2 | BL3 | 4 |
| | a | Discuss functions and utility of FAST diagram | 6 | CO2 | BL2 | 3 |
| 4 | b | A company has received quotes for its recent advertisement for the purchase of a sophisticated concrete mixing machine. | 9 | CO3 | BL4 | 5 |
| | | The data are as per the estimate in today's rupee value.<br><br>| Description | Machine X | Machine Y |<br>|---|---|---|<br>| Purchase Price ₹ | 15,00,000.00 | 20,00,000.00 |<br>| Machine Life (Years) | 7 | 7 |<br>| Salvage value at the end of Machine life ₹ | 2,00,000.00 | 3,00,000.00 |<br>| Annual O & M Cost ₹ | 3,00,000.00 | 2,50,000.00 |<br><br>Assuming an average annual inflation of 5% for the next five years, determine the best concrete mixing machine based on the present worth method. Interest rate is 15%, compounded annually. | | | | |
| | c | It is proposed to carry out valuation of a building enlist the documents required for the same. | 5 | CO1 | BL2 | 6 |
| | a | Discuss the steps in the application of value engineering | 7 | CO2 | BL2 | 4 |
| 5 | b | Explain in detail reason for poor value/unnecessary cost in the construction project. | 8 | CO2 | BL3 | 3 |
| | c | Justify that how value engineering is different than conventional cost reduction techniques. | 5 | CO2 | BL2 | 3 |
| 6 | a | Workout the rent per annum of a property from the following details | 8 | CO3 | BL3 | 2 |
| | | (i)     Cost of land ₹ 6,00,000/-<br>(ii)    Cost of construction ₹ 25,00,000/-<br>(iii)   Required return on land is 6%<br>(iv)   Required return on building is 8%<br>(v)    Estimated life of building is 50 years<br>(vi)   Rate of interest on sinking fund is 6%<br>(vii)  Annual repairs are ₹ 15,000/-<br>(viii) Outgoings are 30% of gross rent<br>(ix)   Scrap vale of building 10% | | | | |
| | b | Discuss the various cost associated with LCC along with opportunities for cost reduction over the life cycle. | 7 | CO2 | BL2 | 5 |
| | c | Discuss the information phase checklist. | 5 | CO2 | BL2 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | a | It is proposed to carry out value engineering for a construction project discuss value engineering job plan for the project. | 8 | CO2 | BL3 | 4 |
| | b | Discuss the purpose of valuation of a building/plot. | 4 | CO1 | BL1 | 1 |
| | c | A company has 3 mutually exclusive project alternatives | 8 | CO3 | BL4 | 5 |
| 7 | | Each alternative has insignificant salvage value at the end of its useful life. Interest rate of 12% compounded annually. Find the best project alternative for expansion of business based on annual equivalent method. | | | | |

| Project | Initial Investment | Annual revenue | Life (years) |
|---|---|---|---|
| 1 | ₹ 30,00,000.0 | ₹ 10,00,000.0 | 10 |
| 2 | ₹ 25,00,000.0 | ₹ 8,00,000.0 | 10 |
| 3 | ₹ 35,00,000.0 | ₹ 12,00,000.0 | 10 |

Max. Marks: 100    Duration: 3 Hours

Class: B.Tech. Civil Sem VIII   Semester: VIII    Program: Civil Engineering

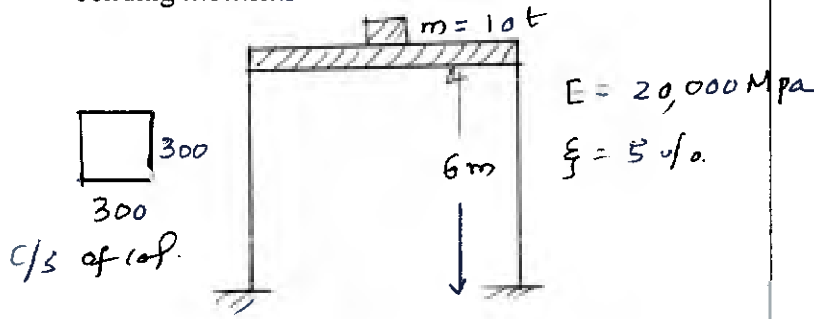Name of the Course: Earthquake Engineering    Course Code : PE- BTC 821

**Instructions:**
- Attempt any FIVE questions out of SEVEN questions.
- Answers to all sub-questions should be grouped.
- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly.

| Question No | | Points | CO | Module No |
|---|---|---|---|---|
| **Q1 (a)** | (i) What is an earthquake? How are earthquakes classified based on their causes? | 3 | 3 | 4 |
| | (ii) Explain briefly the different types of seismic waves and their characteristics. | 3 | 3 | 4 |
| | | | | |
| **Q1(b)** | (i) A single-story structure with a rigid slab is supported on four corner columns as shown in the figure. The height of the structure is 6.0 m. In general, what will be the degrees of freedom for this structure? And specify these DoF. Calculate the structure's natural frequency for excitation in X and Y directions separately. | 5 | 2 | 2 |
| | (ii) If the system is subjected to harmonic ground acceleration with amplitude of 0.3g and excitation frequency of 25 rad/sec in X direction, evaluate the maximum lateral displacement of the slab. The weight on the slab is 150 kg/m², uniformly distributed. Assume $\xi = 5\%$ and E= $2\times10^4$ N/mm². | 5 | 2 | 2,6 |
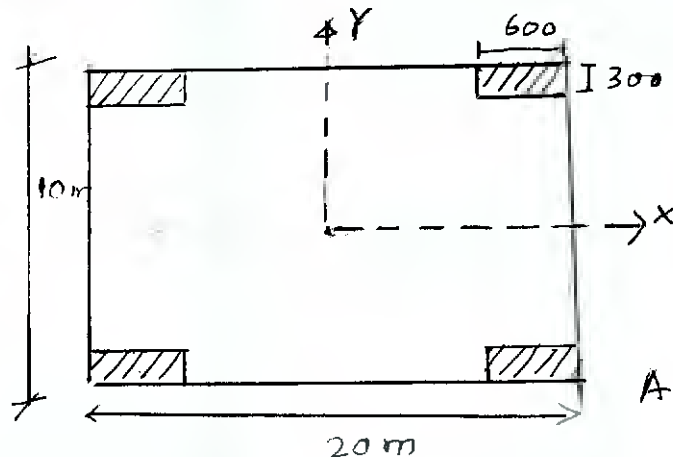


All col. are same 6z4

| | | | | |
|---|---|---|---|---|
| **Q1(c)** | A machine weighing 30,000 N exerts a harmonic force of 3000 N amplitude, at 10 Hz. After installing the machine on the spring damper isolator, the force transmitted to the foundation was reduced to 300N. If $\zeta$ = 10%, determine the spring stiffness K. | **4** | **2** | **2** |
| **Q2 (a)** | (i) A single-story frame with a rigid girder as shown in the figure below is to be designed for ground motion, the response spectrum of which is shown in Figure 1. Determine the design value of lateral deformation and bending moments in the columns | **4** | **2,4** | **5** |
| | (ii) If the frame's columns are hinged at the base, determine the design values of lateral deformation and bending moments in columns  Comment on the influence of base fixity on the design deformation and bending moments. | **4** | **2,4** | **5** |

$m = 10^t$

$E = 20,000 Mpa$

300

300

$\xi = 5\%$

6 m

C/s of col.

| | | | | |
|---|---|---|---|---|
| **Q2(b)** | A two-story frame with free vibration characteristics as given below is subjected to a ground motion whose response spectra is shown in Figure 1  Calculate the maximum displacements of each story   Assume damping ratio $\xi$ = 5%. | **8** | **4** | **3, 6** |

| Floor No. | Mass (t) | Mode No. | $\omega$, rad/sec | Mode Shapes | |
|---|---|---|---|---|---|
| | | | | $\Phi_{i1}$ | $\Phi_{i2}$ |
| 1 | 20 | 1 | 14.58 | 1.0 | 1.481 |
| 2 | 15 | 2 | 38.07 | 1 0 | -0.822 |

| | | | | |
|---|---|---|---|---|
| **Q2( c)** | Explain: (i) Centre of mass and (ii) Centre of Resistance | 1 | 5 | 7 |
| | Explain the provisions of torsion as per IS 1893-2016. | 3 | 5 | 7 |
| **Q3** | The three-story single bay frame has a story height of **4 m.** each. The columns of the ground and 1st story are 300 mm wide X 600 mm deep while the column size for the $2^{nd}$ story is 300mm wide X 450 mm deep. The beams are very stiff. The mass on each floor is **25 t.**       **E = 20000 Mpa.** Calculate natural frequencies & mode shapes | **20** | **2** | **3** |

| | | | | |
|---|---|---|---|---|
| Q4 (a) | The plan of the one-story building is as shown in the figure. The structure consists of a roof idealized as a rigid diaphragm, supported on three frames A, B, and C as shown. The roof weight is uniformly distributed and has a magnitude of 200 Kg/m². The lateral stiffness is $K_y$ = 25000 KN/m for frame A and $K_x$ =30000 KN/m for frames B and C. The plan dimensions are b= 30 m d=20m and e=5.0m. The height of the building is 8m.<br>Determine the natural frequencies and modes of vibrations of the structure<br> | 8 | 2 | 3 |
| | | | | |
| Q4(b) | If the above structure is subjected to ground motion $\ddot{u}_{gy}$ only in the Y direction. write down the equations of motion for the system | 2 | 2 | 3 |
| | | | | |
| Q4(c) | As a special case, if e= 0, and the above system is subjected to the ground motion     only in<br>  (i) X direction<br>  (ii) Y direction,<br>The response spectrum of the ground motion is shown in Figure 1. Determine the design value of lateral deformation, base shear, and bending moment for the system for both cases. | 10 | 4 | 6 |
| | | | | |
| Q5(a) | What is the response spectrum? Explain the procedure to construct an elastic response spectrum for a single recorded ground motion. | 3 | 3 | 5 |
| | | | | |
| Q5(b) | Explain the characteristics of ground motions | 3 | 3 | 5 |
| | | | | |
| Q5(c) | A four-story school building special moment resisting frame has a story height of 4 m for the ground story and 3 m for the 2nd to 4th story. The building is located in Mumbai. The weight | 14 | 5 | 6 |

| | | | | |
|---|---|---|---|---|
| | on the 1$^{st}$ to 3$^{rd}$ floor is 400 KN and on the 4$^{th}$ floor, it is 300KN. Using the equivalent static method, calculate the distribution of lateral loads and story shear. Assume soil strata as a medium. Use the response spectra given in Figure 2. | | | |
| | | | | |
| **Q6 (a)** | (i) State the different methods for calculating earthquake loads as per IS1893-2016. | 1 | 5 | 7 |
| | (ii) Explain: (a). Magnitude (ii) Intensity of an earthquake | 3 | 5 | 7 |
| | | | | |
| **Q6 (b)** | State the limitation of the Equivalent Static Method. As per IS 1893-2016, under what conditions is this method permitted to calculate the earthquake forces? | 2 | 5 | 7 |
| | | | | |
| **Q6 (c)** | As per IS 1893-2016, how many modes need to be considered in the earthquake force calculation by the Response Spectrum Method | 2 | 5 | 7 |
| | | | | |
| **Q6 (d)** | Using response spectrum method, calculate the seismic force on each floor of the frame whose pre vibration properties are given below. Use the following additional data: Z=0 36, I =1.0, R=5.0 and ξ = 5%. Assume foundation strata as soft soil and use response spectrum given in figure 3. Assume the story height as 4m for all story. | 12 | 4,5 | 7 |
| | | | | |
| **Q7 (a)** | (i)What is ductility of a structure? Explain the importance of ductility in seismic resistant structures. | 3 | 5 | 7 |
| | (ii) (ii) What is a shear wall? What are the boundary elements in shear wall? | 2 | | 7 |
| | | | | |
| **Q7 (b)** | (i) A building having a non-uniform distribution of mass is shown in the figure. Locate its center of mass Fig 4 (ii) The plan of a simple one-storied building is shown in the figure. All columns have the same dimensions Obtain the center of stiffness (Centre of Rigidity) Fig· 5 | 2 | 5 | 7 |

Q6 (d) table:

| Story No. | Mass No. | Mass (t) | ω rad/sec | Mode shapes | | |
|---|---|---|---|---|---|---|
| | | | | $\Phi_{i1}$ | $\Phi_{i2}$ | $\Phi_{i3}$ |
| 1 | 1 | 50 | 14.52 | 1.00 | 2.160 | 3.313 |
| 2 | 2 | 50 | 31 05 | 1.00 | 0.893 | -1.473 |
| 3 | 3 | 40 | 46 10 | 1.00 | -1.042 | 0.410 |

| | | 3 | 5 | 7 |
|---|---|---|---|---|
| **Q7 (c)** | The first-floor plan of a building with shear walls is shown in the figure. The plinth-level plan is also the same. Calculate the fundamental period of the building as per the provision of 7.6.2, both in X and Y directions. The total height of the building is 24 m.  Fig.6 | | | |
| | | | | |
| **Q7 (d)** | Explain the provisions of IS 13920-2016, for (i)Beams: General provisions, longitudinal reinforcement (ii) Shear Walls: Provisions related to shear design. | 4 4 | 5 5 | 7 7 |
| | | | | |
| **Q7 (e)** | (i)For the SMRFs idealized as shear buildings with rigid girders, investigate whether the building structure has a soft story. The height of the first story is 4.5 m and that of the remaining is 3.0 m.  Fig.7 | 2 | 5 | 7 |
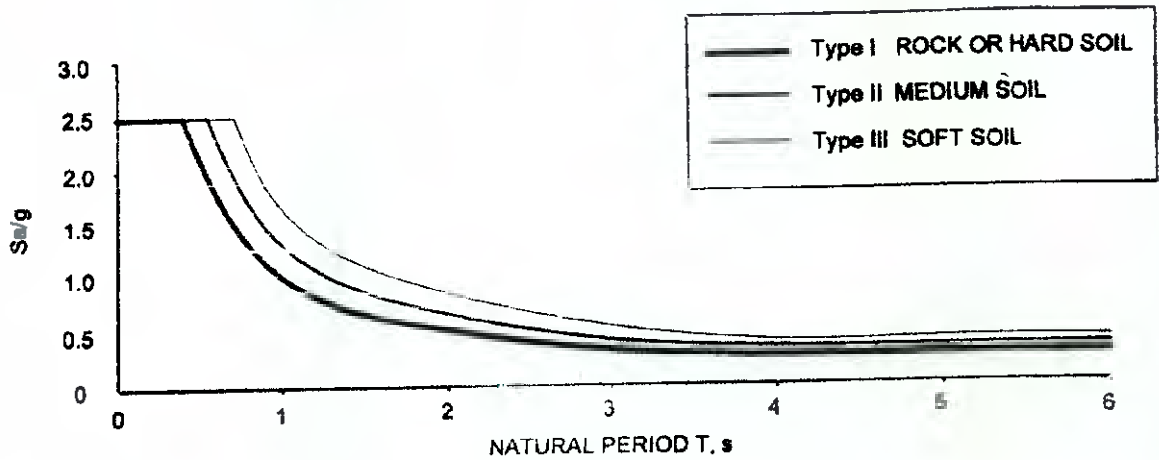
Fig 2
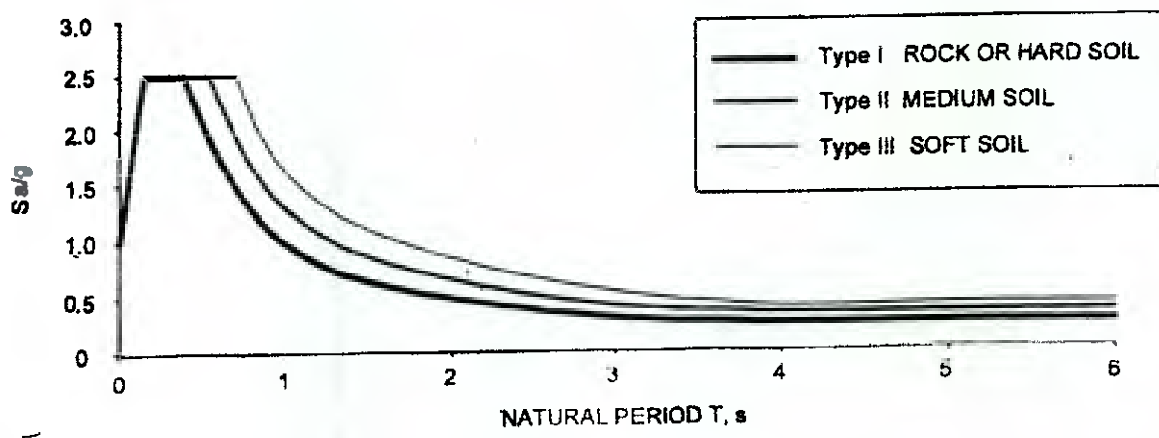
2A SPECTRA FOR EQUIVALENT STATIC METHOD

Fig 3

2B SPECTRA FOR RESPONSE SPECTRUM METHOD

FIG. 2 DESIGN ACCELERATION COEFFICIENT ($S_a/g$) (CORRESPONDING TO 5 PERCENT DAMPING)
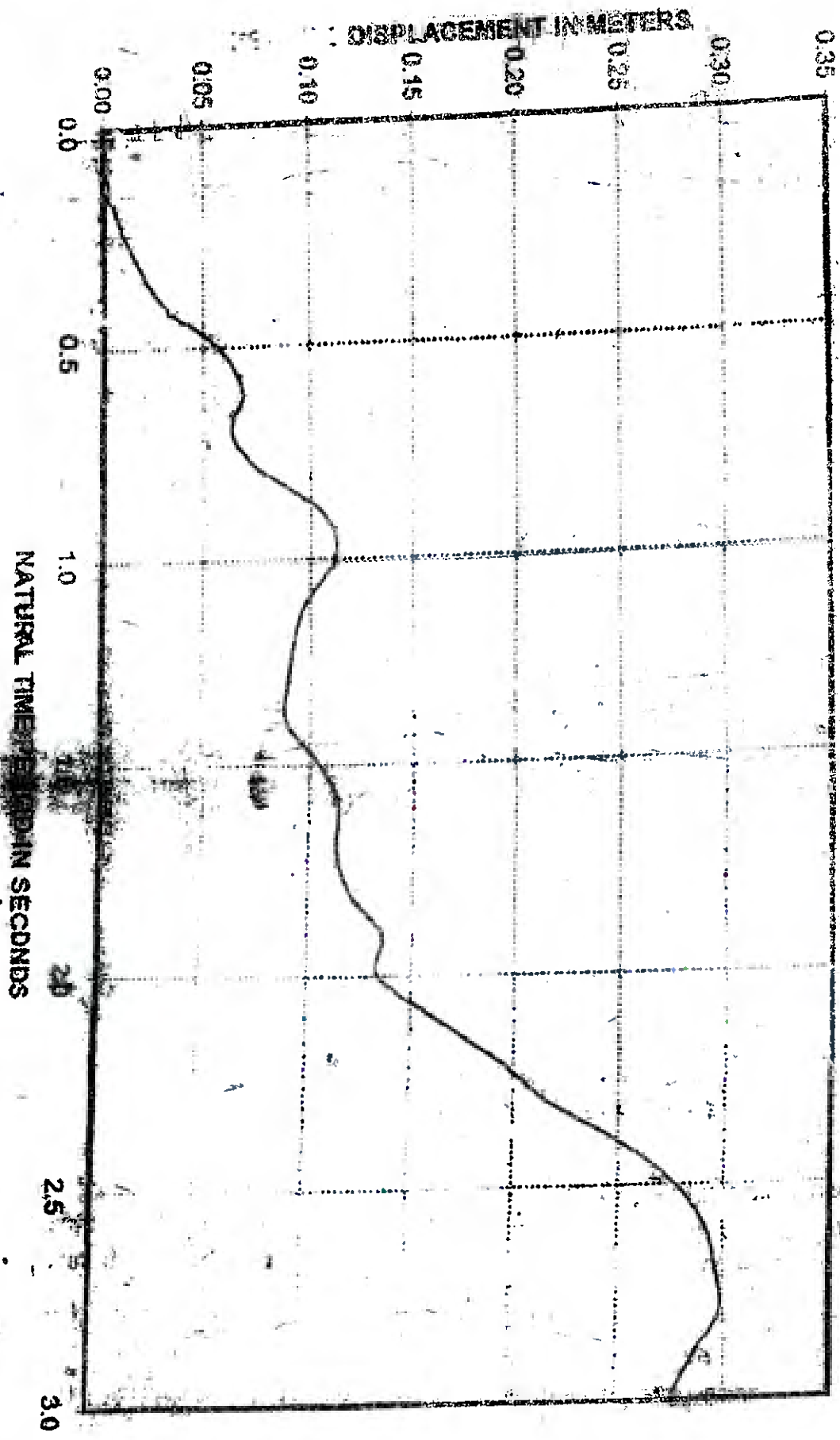
DISPLACEMENT RESPONSE SPECTRA FOR EL-CENTRO EARTHQUAKE FOR 5% DAMPING  PGA = 0.32g

Figure 1
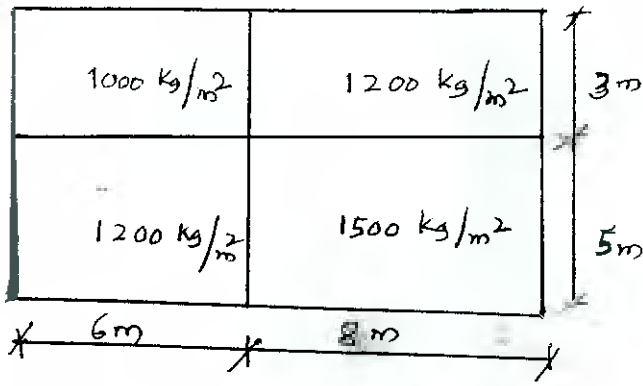
Fig. 4
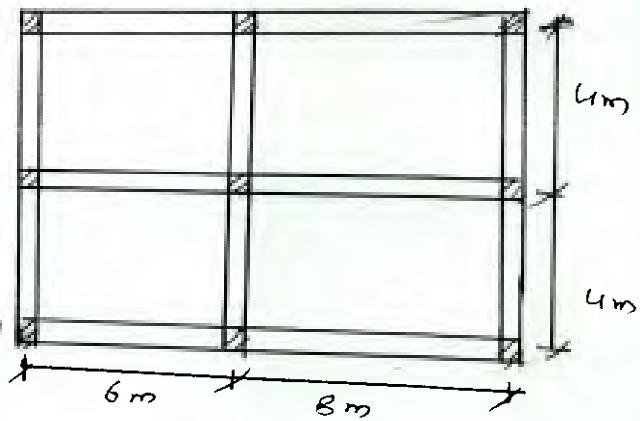


Fig 5
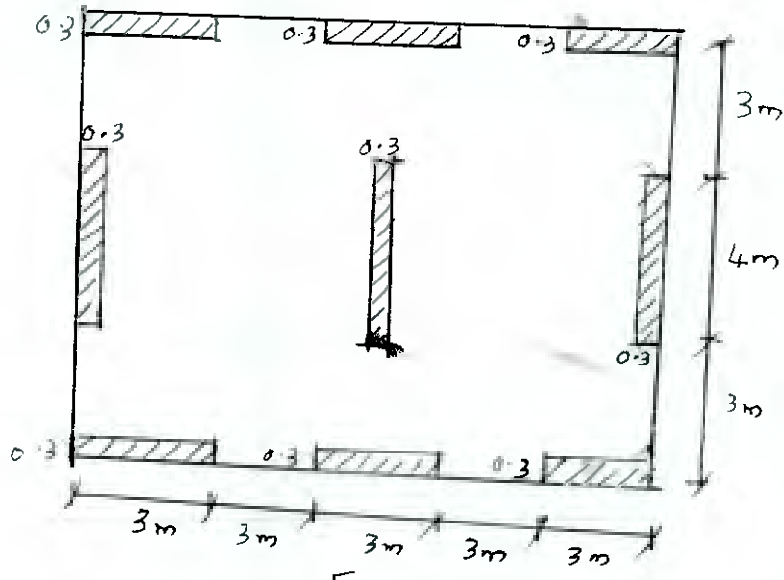


Fig. 6
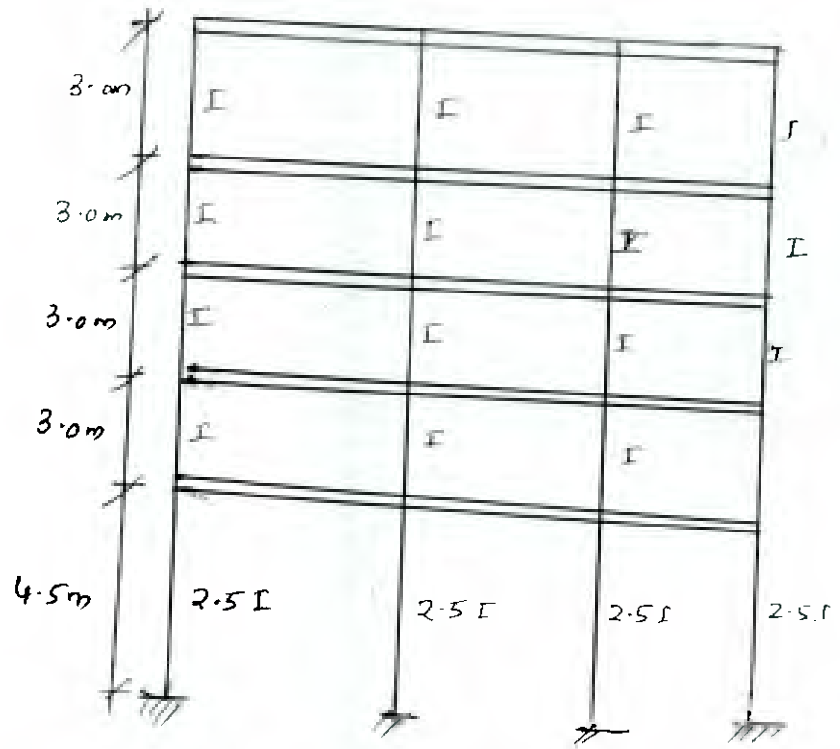


Fig 7

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

## End Semester Exam- June 2024 Examinations

Program: B.Tech Civil Engg.
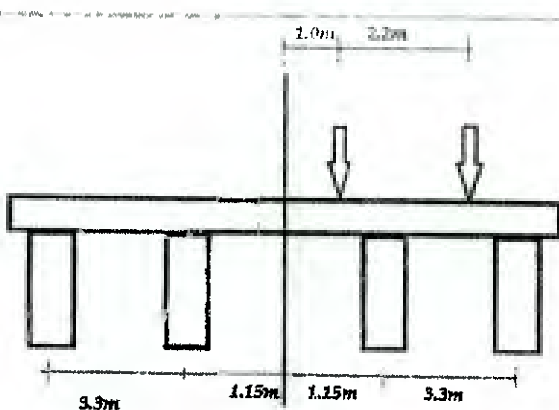
Course Code: PE-BTC822

Course Name: Bridge Engineering

Duration: 3Hours

Maximum Points: 100

Semester: VIII

Notes: 1) Attempt any 5 main questions

2) Assume suitable data if missing and mention the same clearly

3) Draw neat sketches wherever possible

4)Use of IS800,IRC 6,IRC 112 and steel tables is allowed

| Q.No. | Questions | Points | CO | BL | Module |
|-------|-----------|--------|-----|-----|--------|
| 1.a) | Design an RC slab culvert for an effective span of 5.5m and a carriageway of 8m. Wearing coat is of 75mm thickness. Consider single train of IRC Class 70R tracked vehicle loading. SIDL = 7.5kN/m². Use M30 and Fe500 | 15 | 1,4 | 4 | 2,3 |
| 1.b) | Using Courbon's method, obtain the forces transferred to each girder as shown below  | 05 | 1 | 2 | 2,3 |
| 2 | For the steel truss shown below : The total dead load of truss per each nodal point – 150kN Deck width = 8.5m The bridge is to be used as foot over bridge  Design the member AB and AC considering live loads as 5kN/m² and slab thickness as 150mm of RCC. Use fy=250N/mm² | 20 | 4 | 4 | 5 |

**Truss diagram:** 5.8m (height), joints labeled A, C (top), B, D (bottom); span panels 3.5m, 3.5m, 3.5m, 3.5m, 3.5m, 3.5m

| | | | | | |
|---|---|---|---|---|---|
| 3.a) | Explain the different methods for analysis of box girder bridges. | 10 | 2,3 | 2 | 4 |
| 3.b) | Explain the data that needs to be collected before planning and design of a bridge. | 10 | 1 | 2 | 1 |
| 4.a) | Explain the various load cases to be considered for design of piers. | 10 | 1 | 2 | 2 |
| 4.b) | Evaluate the axial load and moment carrying capacity for a pier having following data . Size : 1250mm x 1250mm Reinforcement on each face = 7nos-25mm dia(each face) Effective cover = 60mm Assume N.A = 950mm from extreme compression fibre Concrete grade is M45 and steel grade is Fe500. | 10 | 4 | 4 | 6 |
| 5.a) | Obtain the maximum bending moment and maximum shear force for a girder of span 19.5m subjected to a single class 70R wheeled vehicle and having a courbon factor of 0.50 | 07 | 1 | 4 | 3 |
| 5.b) | Design an RCC girder of span 19.5m as per IRC 112 with following specifications: UDL on girder due to footpath and crash barrier = 7kN/m UDL on girder due to wearing course = 2.5kN/m UDL due to slab = 12kN/m Live load as per Q.5(a) Effective slab width as beam flange = 2.25m Depth of slab = 0.225m Use M40 and Fe500 | 13 | 4 | 4 | 3 |
| 6 | Design a shallow foundation as per IRC 112 for a pier of size 1.25m x 1.25m. The design axial load = 3000kN and design moment along transverse axis = 1100kNm. SBC of soil = 125kN/m². Use M35 and Fe500. Provide checks for a) Flexure b) One way shear c) Punching shear at distance 2 x depth of footing from face of pier and at face of pier | 20 | 4 | 4 | 6 |
| 7.a) | Enlist the various construction methods for bridges. Explain the incremental launching method of construction in detail with sketches. | 10 | 2,3 | 2 | 7 |
| 7.b) | Explain the components and suitability of the following with neat sketches : i) Cable stayed bridges ii) Suspension bridges | 10 | 2,3 | 3 | 7 |

## Bharatiya Vidya Bhavan's
## SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)
Munshi Nagar Andheri (W) Mumbai 400058

### End Semester Exam
### June 2024

Max. Marks:   100

Class:   B. Tech Civil

Name of the Course:  Environmental Impact Assessment

Course Code:PE BTC841

Duration: 3 Hrs

Semester: VIII

Program: Civil

Instructions:
- Attempt any 5 questions
- Draw neat sketches/diagrams wherever required and give reasoning wherever required
- Assume suitable data if necessary and state them clearly
- Figure on right indicate maximum points for the given question, course outcomes attained and Bloom's Level

| SN | Questions | Points | CO | BL |
|---|---|---|---|---|
| Q1 | Answer any 4 of the following questions: | (20 points) (4*5 points) | 1-4 | 2,3 |
| (a) | Explain why and when public participation is carried out in the EIA process | | | |
| (b) | Explain adhoc and list method and enlist drawbacks of Adhoc and checklist method of EIA assessment | | | |
| (c) | Explain in short the steps in EIA study with the help of flowsheet | | | |
| (d) | Explain design of an air impact assessment study | | | |
| (e) | Where and how Index of quantitative variation of ethnicity used? | | | |
| (f) | Compare EIA notification 2006 with notification draft of 2020 | | | |
| | | | | |
| Q2 | Answer the following questions: | (20) | 1-4 | 3,4 |
| (a) | Explain the steps in water impact assessment in detail | (05) | | |
| (b) | Explain the steps of noise impact assessment in detail | (05) | | |
| (c) | A pharmaceutical company has been operating for several years (more than 20 yrs) in a terrain with the following characteristics: porous, filterable with a phreatic level near to the surface (1.5 m depth). The company was located close by to an estuary branch which is quite useful for them since they discharge all the disposals and waste generated by this activity directly into the estuary. These disposals contain a high level of toxic and gene altering compounds. All the discharges goes directly into the soil since there are no sewers or gutters. The pharmaceutical company use to operate for 20hrs for seven days in a week. The | (10) | | |

| | | | | |
|---|---|---|---|---|
| | Municipality has arranged the execution of an EIA study and you are a part of it as that area is going to be used for **residential complex construction (spread in 10 acres)** <br>    (i)    Mention and explain five major environmental impacts of this activity <br>    (ii)   Which studies will be important to be carried out and why? <br>    (iii)  Mention and explain five mitigation measures you will propose as part of your EMP to mitigate the impacts identified ? | | | |
| **Q3** | Answer the following questions (any 4) | **(20)** <br> **(4*5 points)** | **1-4** | **5, 6** |
| **(a)** | Write down the chapters with explanation to be included in EIA report | | | |
| **(b)** | Explain social cost benefit analysis | | | |
| **(c)** | Explain concept of Leq. Find Leq for 10 hrs if one reading is taken per hour 70dBA, 80dBA, 72dBA, 78dBA, 76dBA, 75dBA, 70dBA, 82dBA, 81dBA, 90dBA. | | | |
| **(d)** | Explain the indicators considered in Socio economic impact assessment | | | |
| **(e)** | Explain how the biodiversity index will be found out for a small patch of forest in detail | | | |
| **Q4** | Answer the question | **(20)** | **2-4** | **3-4** |
| **(a)** | A new airport is coming up in a city which is financially hub and which is close to sea (away from the main city) but the project will improve the connectivity globally. An environmental impact study is to be conducted and you are a part of EIA team. How would you go about designing and conducting the study. What can be the probable impacts and what would be the mitigation measures. Design Environmental management plan for the same. | | | |
| **Q5** | Answer the questions | **(20)** | **1-4** | **3-4** |
| **(a)** | **State True or false with reasoning (Reasoning to be given for both true or false)** | **(5*2 points)** | | |
| **(i)** | Environmental clearance: Period of validity may be extended by a maximum period of two years provided an application is made to the regulatory authority by the applicant within the validity period, together with an updated Form 1 | | | |
| **(ii)** | Baseline should be extended in absence and presence of the project | | | |
| **(iii)** | Impact assessment is done for the planned project and the identified alternatives. | | | |
| **(iv)** | The EIA Report is compiled by the designated government agency | | | |
| **(v)** | Frequency of monitoring will be determined by the nature of the project | | | |

| | | | | |
|---|---|---|---|---|
| (vi) | An EIA is a process a proponent undertakes before an Environmental clearance is issued. | | | |
| (b) | A forest land is identified as the mining area for iron ore. The terrain with the following characteristics: rolling terrain and a phreatic level near to the surface (1 m depth). The Indian Government wants to take up EIA study for that given area in eastern ghats.It is found that there are 4 tribes close to extinction staying in that are whereas 3 rivers run nearby. You are the chief EIA coordinator<br>    **(i)    Mention and explain five major environmental impacts of this activity**<br>    **(ii)    Which studies will be important to be carried out and why?**<br>    **(iii)    Mention and explain five mitigation measures you will propose as part of your EMP to mitigate the impacts identified ?** | (10) | 1-4 | 3-4 |
| | | | | |
| Q6 | A hydropower and irrigation project is to be constructed in mountainous region of Uttarakhand near Tehri region and an EIA is to be conducted. The main terrain is of sedimentary and metamorphic rocks and there are two major rivers passing by the terrain. As an EIA coordinator for the project which is the clearances you require to apply for? How would the entire EIA study will be planned with number and type of experts you need to hire. Explain major steps of the study, with environmental impacts, mitigation and monitoring plan for the same. | (20) | 1-4 | 3-4 |
| | | | | |
| Q7 | A new national highway is to be constructed in mountainous region of Himachal Pradesh which is known for birding and an EIA is to be conducted. The main terrain is of sedimentary rocks. There are several small rivulets and falls in that area. Flooding keeps happening in that region often. As an EIA coordinator for the project which is the clearances you require to apply for? How would the entire EIA study will be planned with number and type of experts you need to hire. Explain major steps of the study, with environmental impacts, mitigation and monitoring plan for the same. | (20) | 1-4 | 3-4 |

**All the best**

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

**END SEMSTER EXAM- JUNE 2024**

Program: Civil Engineering Sem (VIII)    Duration: 1 hr.

Course Code: PE-BTC-853    Maximum Points: 20

Course Name: Appraisal & Implementation of Infrastructure Projects

Semester: VIII

**Notes:**

1. Q.1 is compulsory & attempt any four out of remaining six
2. Illustrate answer with neat sketches wherever required.
3. Make suitable assumptions where necessary and state them clearly.

| Q.No. | Questions | Points | BL | CO | Module No. |
|-------|-----------|--------|----|----|------------|
| 1. | **Attempt any Four**<br>1. Make a list of Financial Institutions available for Infrastructure Finance.<br>2. Make a list of reasons for common Infrastructure project Failure in India.<br>3. Make a list of processes in performance controlling phase of Infrastructure projects.<br>4. Write a short note on contents of Detailed Project Report.<br>5. Write a short note on Economic Appraisal. | 20 | L1 | 1-3 | 1-7 |
| 2 | A. Define: Infrastructure. Explain any five challenges faced by rural infrastructure and government schemes sponsored to rural infrastructure.<br>B. Define: Project Formulation. Discuss the various elements of project formulation. | 12 +8 | L1 | 1 | 1,2 |
| 3 | A. Write a short note on BOT.<br>B. Discuss the objectives of Detailed Project Report. (Any two). Also explain aspects of Detailed Project Report in detail.<br>C. Explain the various processes involved in project concept analysis phases of infrastructure project life cycle. | 4+8+8 | L1 | 1,2 | 2 |
| 4 | A. Write a short note on Environmental Appraisal.<br>B. What do you mean by Technical Appraisal? Explain shortly any four aspects of technical appraisal.<br>C. Define: Project Audit. What are the necessities to do project audit in Infrastructure? (Any three) Explain the various Phases of Project Audit in Infrastructure? | 5+5+10 | L2/2 | 1,2 | 3,4,5 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | A. What do you mean by Infrastructure Project Finance? Explain all types of finance available for Infrastructure Development in India.<br>B. What is Planning Commission of India? Explain any four functions of planning commission in Infrastructure Development in India. | 14 +6 | L1/2 | 2,3 | 6 |
| 6 | A. Define: Financial Appraisal.<br>1. Find IRR if Invest Rs.2,000 now, receive 3 yearly payments of Rs.100 each, plus Rs. 2,500 in the 3rd year.<br>2. Invest Rs.20,000 now and receive 3 yearly payments of Rs.5,000 each, plus Rs.12,000 in the 3rd year. Use 10% discount Rate. Find NPV. Can be accepted the project?<br>B. Define: NPV & IRR.<br>1. A company manufactures a single product which has the following cost structure based on a production budget of 10,000 units.<br>Materials– 4 kg at Rs.3/kg = Rs.12<br>Direct labour– 5 hours at Rs.7/hour = Rs.35<br>Variable production overheads are recovered at the rate of Rs.8 per direct labour hour.<br>Other costs incurred by the company are: Factory fixed overheads ,Selling and distribution overheads , Fixed administration overheads are 1,20,000, 1,60,000 80,000 respectively. The selling and distribution overheads include a variable element due to a distribution cost of Rs.2 per unit. The fixed selling price of the unit is Rs.129.<br>(a) Calculate how many units have to be sold for the company to breakeven. (b) Calculate the sales revenue which would give a net profit of Rs.40, 000.<br>2. Company XYZ considering two potential projects: building a new factory, or expanding an existing one. The factory expansion project is expected to cost Rs. 20,00,000 million and generate cash flows of Rs. 4,00,000 per year for the next 5 years, with a discount rate of 10%. The new factory project is expected to cost Rs 40, 00,000 and generate cash flows of Rs. 6,00,000 per year for the next 5 years, also with a discount rate of 10%. Decide which of the above seems fore feasible investment decision on the basis of Profitability Index method. | 8+12 | L3 | 2,3 | 4,5 |
| 7 | A. What do you mean Payback Period?<br>1. An EMF company requires an initial investment of Rs.2, 00,000 now and expected the amount of cash inflows are following, : Year-1 cash Inflow: Rs.75,000 ,Year-2 cash Inflow: Rs.65,000 ,Year-3 cash Inflow: Rs.50,000,Year-4 cash Inflow: Rs.45,000, Year-5 cash Inflow: Rs.40,000, Year-6 cash Inflow: Rs.35,000. Compute the payback periods of the new investment opportunity. Is these | 10+10 | L3 | 2,3 | 4 |

investment opportunity acceptable if the maximum desired payback period of the management is 3 years?

2. Aakash is a manager of a Carpet factory. His factory has been quite successful the past three years. He is wondering whether or not it is a good idea to expand his factory this year. The cost to expand his factory is 2, 00,000. If he does nothing and the economy stays good ·and people continue to buy lots of carpets, he expects 3, 00,000 in revenue; while only 1, 00,000 if the economy is bad.

If he expands the factory, he expects to receive 8, 00,000 if economy is good and 2, 50,000 if economy is bad.

He also assumes that there is a 40% chance of a good economy and a 60% chance of a bad economy. Draw a Decision Tree showing these choices.

**B. What do you mean by decision tree analysis?**

For a project with the given data, calculate the real rate of return by assuming rate of inflation 10% on a compound basis every year,

| Yr | Cash Outflow (in lac) | Cash Inflow (in lac) (Without considering inflation) |
|----|----|----|
| 0 | 10 | 0 |
| 1 | - | 4.0 |
| 2 | - | 2.5 |
| 3 | - | 2.5 |
| 4 | - | 2.0 |
| 5 | - | 2.0 |
| 6 | - | 1.5 |