SECTION - A

There are FOUR questions in this section. Answer any THREE.

1. (a) Two 2" X 8" Visually Graded No. 1 Alaska Spruce is used together to be used as a single beam to carry dead load only. The beam is used in wet conditions and normal temperature. Also, the beam is laterally supported along its length and at each end. Total load on the beam is 300 lb/ft and the span of the beam is 12 feet.

Use Annexure 1, 2 & 3 for required data. Assume a reasonable value for any missing data.

(a) Assuming the beam simply supported at both ends, locate the section where maximum bending stress develops and determine the magnitude of maximum bending stress on the section. (5)

(b) Determine the allowable bending stress, $F_{lb}$, for the beam. (6)

(c) Based on the answers from (a) and (b), determine if the beam is adequate to support the load. If not, determine the number of additional 2" X 8" lumbers that are needed to reduce bending stress below allowable stress. (7)

(d) Locate the section where the maximum value for shear force is observed for this beam. Also compute the maximum shear stress check the adequacy of the section (after modification in (c), if any) for shear. (5 1/2)

2. (a) For the beam in Question 1 (initial section, two 2" X 8" Visually graded No. 1 Alaska Spruce), calculate the maximum deflection due to dead load. Also state if this deflection is within allowable deflection limit for dead load.

Use Annexure 1, 2 & 3 for required data. Assume a reasonable value for any missing data. (4)

(b) The beam in 2(a) is to be supported by columns at the ends. Determine the required bearing area at the supports. (3)

Use Annexure 1, 2 & 3 for required data. Assume a reasonable value for any missing data.

(c) Select the lightest W shape from the Table provided in Annexure 4 to support a dead load of 120 kips and a live load of 250 kips. The column is 32 feet long. Assume that it is pin supported at the top and bottom in both directions that an additional support is provided at mid-height to prevent buckling against the y-axis. Use AISC/ASD formulae and AISC Allowable axial load table. $F_y = 36$ ksi. (16 1/2)
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3. (a) Compute the axial load carrying capacity of the column shown in Figure 1. The column is fixed at both ends and braced at mid-height against buckling about the weak axis. Use A36 steel properties. Given that,

\[ F_a = \frac{F_y \left[ 1 - \frac{1}{2} \left( \frac{KL}{r} \right)^2 \right] \left( \frac{KL}{r} \right)^3}{3 + \frac{3}{8} \left( \frac{KL}{r} \right)^2 - \frac{1}{8} \left( \frac{KL}{r} \right)^3} \quad \text{if} \quad \frac{KL}{r} \leq \frac{C}{E} \]

\[ F_a = \frac{12\pi^2 E}{23} \left( \frac{KL}{r} \right)^2 = \frac{149000}{\left( \frac{KL}{r} \right)^2} \quad \text{if} \quad \frac{KL}{r} \geq \frac{C}{E} \]

\[ C_e = \pi \sqrt{\frac{2E}{F_y}} \]

(b) Define elastic, inelastic and intermediate failure zone for compression members with proper illustrations.

4. (a) Write a short note on Beam slenderness Ratio, \( R_B \).

(b) Write short notes on—

(i) Bearing Area Factor, \( C_b \)

(ii) Cellular makeup of woods

(iii) Effect of moisture content and shrinkage on properties of wood

(c) What is Beam Stability Factor, \( C_L \)? Why is it important to consider lateral stability? How can you handle this issue if a beam is laterally unstable?

SECTION – B

There are FOUR questions in this section. Answer any THREE.

5. Following data are given for the question below:

CGI roofing = 2.0 psf
Self-weight of purlins = 1.5 psf
Spacing between adjacent trusses = 25 ft
Design Wind Pressure:
Windward Side = –5 psf
Leeward side = –20 psf

Trial section for Purlin (A36 steel):
1) C 4 X 7.25 (Sxx = 2.29 in³, Syy = 0.343 in³)
2) C 5 X 9 (Sxx = 3.56 in³, Syy = 0.45 in³)
3) C 7 X 9.8 (Sxx = 6.08 in³, Syy = 0.625 in³)

Contd .......... P/3
Sagrod is provided at half the distance in between trusses.
Consider X-axis in the plane of roofing and Y-axis in the perpendicular direction of
the plane of roofing. Equation for moment about X-axis is $wL^2/8$ and moment about
Y-axis is $wL^2/32$.

Check the adequacy of the trial purlin sections considering both dead load and wind
load for the truss shown in Figure 2. Comment on, whether the section (1), (2), (3)
are adequate or not.

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6. Calculate the joint loads for dead load and wind load (show the loading diagram with
loads at the joint) for the 30 ft span interior truss of an industrial building (Figure 2).
Spacing between two adjacent trusses (bay) is 25 ft. Show the loads with neat sketches.

Given:

Loads:
(a) CGI Sheet Roofing = 2.0 psf
(b) Purlins = 1.5 psf
(c) Sagrod, Bracings = 1 psf
(d) Self-weight of Truss = 50 lb/ft of horizontal span

Design Wind Speed = 210 km/h
Wall Height = 12 ft
$C_c = 47.2 \times 10^{-6}$
$q_z = C_c C_{c0} q_{z0}
\quad p_z = C_0 C_{pe} q_z$
$1 \, \text{kN/m}^2 = 20.88 \, \text{psf}$

Other charts are enclosed with the question (Annexure 5, 6, 7)
7. Design the following members of an industrial roof truss (shown in Figure 2 from the load table given below:

<table>
<thead>
<tr>
<th>Member</th>
<th>Member Force (kip)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dead load (kip)</td>
</tr>
<tr>
<td>U₂U₃</td>
<td>-9.5</td>
</tr>
<tr>
<td>U₂L₃</td>
<td>-4.0</td>
</tr>
<tr>
<td>U₁L₁</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Assume, K = 0.6, Fₛ = 36 ksi, E = 29000 ksi (Annexure 9 is attached for section properties)

8. (a) Write down the assumptions for analysis of a truss.

(b) Suppose, members U₂U₃ and U₂L₃ mentioned in Question 7 (refer to Figure 2) are designed to be \( \frac{1}{2} \times \frac{3}{4} \times \frac{1}{4} \) and \( \frac{1}{2} \times \frac{5}{16} \) respectively. At node U₂ both of them are connected to a gusset plate of thickness 3/8 inch. Design fillet welds for this connection. Given, Fₛ = 36 ksi. Use Annexure 8, 9.
1. (a) Define any 6 (six) of the following with necessary diagrams:
   (b) If a sinusoidal current, \( i = I_m \sin \omega t \), flows through a series circuit consisting of a resistive element \( R \), and an inductive element \( L \) as shown in Fig. for Q. No. 1(b), then
      (i) Find the applied voltage, \( v \)
      (ii) Find the instantaneous power, \( p \)

2. (a) What are the different stages/steps to complete Electrical System Drawings of a big high rise building? Describe them in brief.
   (b) What are the different types of Electrical Wiring/Installation System practicing in our country? Describe any 5 (five) of them, with necessary diagrams.

3. Write short notes on any of the 2 (two):
   (a) Safety of Men and Machines
   (b) Lightning Protection System Design
   (c) Earthing System Design.

4. The same plan of a simple house are shown in Figs. 4(a) and 4(b).
   (a) Show the "Fittings and Fixture Layout Design" in Fig. 4(b) and attach this sheet with your answer script.
   (b) Show the Switch-Board Connection Diagram of the above design in your Answer Script.
   (c) Show the Legends, used in the above design, with short description.
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SECTION - B
There are FOUR questions in this section. Answer any THREE.

5. (a) With simple examples, define any 5 (five) of the following:
   (i) Ohm's Law (ii) Electromotive Force (EMF) (iii) Kirchhoff's Current Law
   (iv) Thermistor (v) Kirchhoff's Voltage Law (vi) Linear Circuit and (vii) Thyrite
   (b) Using Delta-Wye Transformation, find the current $I_0$ of the circuit shown in Fig. for Q. No. 5(b).

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   (i) Ohm's Law (ii) Electromotive Force (EMF) (iii) Kirchhoff's Current Law
   (iv) Thermistor (v) Kirchhoff's Voltage Law (vi) Linear Circuit and (vii) Thyrite
   (b) Using Delta-Wye Transformation, find the current $I_0$ of the circuit shown in Fig. for Q. No. 5(b).

6. (a) Using the method of "Branch Currents", find the currents in each branch of the circuit shown in Fig. for Q. No. 6(a).

6. (a) Using the method of "Branch Currents", find the currents in each branch of the circuit shown in Fig. for Q. No. 6(a).

(b) Determine the Loop/Mesh Currents $I_1$, $I_2$ and $I_3$ for the following circuit shown in Fig. for Q. No. 6(b).

(b) Determine the Loop/Mesh Currents $I_1$, $I_2$ and $I_3$ for the following circuit shown in Fig. for Q. No. 6(b).

Contd ........... P/3
7. (a) A battery which gives 160 A on short circuit will supply a current of 7.5 A to a resistance of 2.25 \(\Omega\) to its terminals. What is the EMF of the battery? What is the internal resistance? 

(b) Using the superposition theorem, find the current through the branch AB of the circuit shown in Fig. for Q. No. 7(b).

8. (a) Using Thevenin's Theorem, find the current in the branch "BD" in the circuit shown in Fig. for Q. No. 8(a).

(b) Using Norton's Theorem, find the current in the branch AB with resistance 3.3 \(\Omega\) of the circuit shown in Fig. for Q. No. 8(b).
Reflected Ceiling Plan

LIVING AREA

[Fig for Q. No. 4(b)]
[Fig. for Q. No. 4(b)]

LIVING AREA

Fittings & Fixture Layout

Reflected Ceiling Plan
1. What is anthropology? Discuss the subdisciplines of anthropology. 

2. (a) Discuss the classification of cities. 
   (b) Explain the growth of cities. 

3. Define urbanization. Explain the impact of urbanization on family structure. 

4. Write the features of urban life on the basis of Louis' Wirth's on 'Urbanism as a way of life'. 

5. Write short notes on any TWO of the following 
   (a) The usefulness of anthropology 
   (b) Inadequate Housing and Homelessness 
   (c) Human adaptability. 

SECTION – B 

There are FIVE questions in this section. Answer Q. No. 5 and any THREE from the rest. 

6. Discuss the Origin of Architectural Research. 

7. Discuss the relationship between habitat research and architectural anthropology. 

8. Describe the evolutionary theory of architecture. 

9. 'Urbanism as a characteristics mode of life may be approached empirically'– Discuss. 

10. Write short notes any TWO of the following: 
   (a) Architectural theory 
   (b) Cultural theory 
   (c) Global Anthropology.
SECTION – A

There are FOUR questions in this section. Answer Q. No. 1 and any TWO from the rest.

1. Briefly discuss the following interior building elements. (20)
   (a) Floor
   (b) Ceiling

2. (a) Describe with sketches the different types of windows with their advantages and disadvantages. (12½)
   (b) Discuss various types of floor finish materials used in interior spaces. (12½)

3. Discuss Wall and Wall finishes with respect to following headings: (25)
   (a) Wall Forms
   (b) Wall openings
   (c) Wall Articulation
   (d) Wall Texture
   (e) Wall Color.

4. Write short notes on (Any Two) (12½ × 2 = 25)
   (a) Doors and space planning
   (b) Stair and their finished
   (c) Ceiling finishes.

SECTION – B

There are FOUR questions in this section. Answer any THREE.

5. (a) What do you understand by 'Proportion'. Describe 'Proportioning System'. (10)
   (b) Define 'Balance'. Describe three types of visual balance of interior design with necessary sketches. (13½)

Contd .......... P/2
6. (a) What are the physical systems of a building? Describe enclosure system and mechanical system. (8½)
   (b) Short notes on: (i) Rhythm (ii) Emphasis (iii) Texture (15)

7. (a) Describe psychological properties of colours. (8½)
   (b) Describe three dimensions of colours. (3)
   (c) Describe— (12)
      (i) Brewster or Prang Colour Wheel
      (ii) Munsell System

8. (a) Why do architects need to know about interior design? (10)
   (b) Explain the followings in relation to the interior design process and discuss the implementation process. (13½)
      (i) Analyze
      (ii) Synthesis
      (iii) Evaluate.
SECTION – A
There are FIVE questions in this section.
Answer Question No. 5 and any THREE from the rest.

1. What is Urban Design? Discuss the historical context for the development of urban design as a discipline. (17)

2. Discuss and compare 'Greek Agora' and 'Roman Imperial Forum' with illustrative examples. (17)

3. What was the socio-cultural perspective of 19th and 20th century urban design? What form evolved from the context? (17)

4. List the elements that are considered in Urban Design decision making. Elaborate on 'Building Form and Massing' with illustrative examples. (17)

5. Write short notes on:
   (a) Streetscape and Pedestrian Ways
   (b) Travel Demand Analysis. (9½ × 2 = 19)

SECTION – B
There are FIVE questions in this section.
Answer Question No. 10 and any THREE from the rest.

6. Discuss the basic orientation and domain of Urban Design, with which a professional deals with. (17)

7. Discuss the 'Basics' and 'Attributes' of Urban Design at various levels of application. (17)

8. What are the measurable environmental criteria in Urban Design? Describe with examples. (17)

9. Discuss 'Scale and Human vision', 'Process' and 'Principles' of Urban Design with examples. (17)

10. Write short notes on the following (Any two)
    (a) Image and Identity in Urban Design
    (b) New Urbanism
    (c) Sequence and Spatial organization. (9½ × 2 = 19)