1(a) (i) What are the advantages and disadvantages of indeterminate structures? [06]

(ii) Find out kinematic and static indeterminacy for the structures shown in Fig 1(a-c).

1(b) Find the fixed end moments and draw the bending moment diagram for the beam shown in Fig.2. Take EI constant and use Mohr’s theorem. [06]
1. A continuous beam ABCDE is loaded as shown in Fig.3. Support B sinks by 2 cms whereas support C rises by 1 cm. Draw shear force and bending moment diagrams for the beam. Use three moment equations method (Castigliano's theorem). Take $E = 210 \text{GPa}$ and $I = 10,000 \text{cm}^4$.

2. Analyse the continuous beam as shown in Fig.4 and draw BMD and Elastic curve. The support B rises by 20 mm whereas C sinks by 30 mm. Take $E = 200 \text{ GPa}$ and $I = 10^7 \text{mm}^4$.

3. Determine $\Sigma \delta \nu$ for the structure shown in Fig.5 using unit load method. Take $E = 200 \text{ GPa}$; $A_c = 10,000 \text{mm}^2$ and $A_t = 6000 \text{mm}^2$. 

Contd.......3
3' Determine T or C in member AD for the structure shown in Fig.6. Take $E=200 \text{ GPa}$; $A_c = 10,000 \text{mm}^2$ and $A_c = 6000 \text{mm}^2$.

4(a) An arch in the form of a parabola with axis vertical has hinges at abutments and at the vertex. The abutments are at different levels, the horizontal span being $L$ and the height of the vertex above abutments being $h_1$ and $h_2$. Show that the horizontal thrust due to load $w$/unit length uniformly distributed across the span is $\frac{wL^2}{2(\sqrt{d_1} + \sqrt{d_2})^2}$.

4(b) Two parabolic arches have a common hinge at B that forms part of a roller bearing there and are hinged to the springing at A and C. If $E_c I_c$ is same for both the arches and $I_c = I_c \sec \theta$, determine the normal thrust and bending moment at the crown of the left hand arch under the given load (Fig.7).

5(a) Show that the length of the cable under self weight is $S = \frac{H}{w} \sinh \frac{wL}{H}$.
5(b) An un-stiffened suspension cable carries a uniformly distributed load of 10kN/m over a span of 30m as shown in Fig.8. The suspension cable is supported on frictionless rollers fixed at to the piers. The cable is inclined at 30° to the horizontal. One pier is 4.5m below the other and the maximum dip at the lowest point is 3m below the lower pier. Calculate (a) maximum and minimum tension in the cable and (b) the horizontal and vertical force at each pier.

OR

5' A suspension bridge with two hinged stiffening girder as shown in Fig.9 has a span 120m. The profile of the cable is parabolic with central dip 18m. A live load of 3kN/m crosses the central half of the bridge deck. Determine the horizontal component of tension in the cable. The diameter of the cable= 40mm; the moment of inertia of the girder = 2x10⁹mm⁴. Take E=200GPa for both cable and girder. Draw BMD for the girder.
2012-13
B.TECH. (WINTER SEMESTER) EXAMINATION
CIVIL ENGINEERING
ENGINEERING HYdraulics 1
CE-316

Maximum Marks: 60
Credits: 04
Duration: Three Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No Question

1(a) Derive Hagen-Poiseuille's equation for laminar flow through a circular pipe. Oil of dynamic viscosity 0.835 Ns/m² flows through two parallel plates kept 2 cm apart. If the velocity midway between the plates is 6 m/s, what is the pressure gradient in the direction of flow? Also determine average velocity.

1(b) Explain Pi-Buckingham Principle of dimensional analysis. Derive scales for acceleration, force and power based on Froude Law.

OR

1(a)' In turbulent flow in a 30 cm diameter pipe, the velocity at the centre is 600 cm/s and that at 5 cm from the wall is 525 cm/s. Calculate the average velocity, the friction factor, and the discharge.

1(b)' Discuss various types of similarities law with examples. Develop a relation between maximum and average velocities for laminar flow between parallel plates.

2(a) Explain the mechanics of the eddy formation in the separation zone. Discuss the variation of CD with Re in the case of cylinder.

2(b) Thickness of the turbulent boundary layer at the end of 3.0 m long plate is 4.2 cm. If the fluid is water at 15°C, determine (i) Reynolds number at the trailing edge of the plate (ii) free stream velocity (iii) average shear stress on the plate, and (iv) shear stress at the end of the plate. Assume v = 1.2 x 10⁻⁶ m²/s.

OR

2(a)' A cylinder 1.0 m in diameter and 10.0 m length is kept in a uniform stream of water having 10 m/s velocity. The cylinder axis is perpendicular to flow and the cylinder is rotated about its axis at 300 rpm. Determine (i) circulation (ii) position of stagnation points (iii) lift force (iv) lift coefficient (v) the rotational speed of the cylinder which yields only a single stagnation point. Neglect the effect of viscosity.

2(b)' Explain the concept of hydrodynamically smooth and rough surface. A 4.5 wide and 36 m long smooth flat plate is towed through water (μ = 0.01 poise) at a speed of 6.0 m/s. Determine the total drag on one side of the plate and the drag on the first 3 m of the plate.

Contd……2
Find the discharges in the branching system as shown in the following figure. The pipe line data are given as:

<table>
<thead>
<tr>
<th>Pipe</th>
<th>Diameters (cm)</th>
<th>Length (m)</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>3000</td>
<td>0.015</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>600</td>
<td>0.024</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>1200</td>
<td>0.020</td>
</tr>
</tbody>
</table>

OR

3' Derive pipe flow parameters for pipes connected in parallel. A 120 cm diameter steel pipe having 9mm thickness carries water at a rate of 2.0 m³/s. Determine the increase in the pressure if the valve at the end of 300 m long pipe is closed in 3 seconds. Take Young's modulus \((E_m)\) for steel = \(2.07 \times 10^{11}\) N/m² and Bulk modulus \((E)\) for water = \(2.075 \times 10^8\) N/m²

4(a) Prove that the maximum power will be developed when peripheral velocity is half the jet velocity for the impulse turbine.

4(b) Draw velocity diagrams at inlet and outlet for the reaction turbine with neat sketch. Explain the working principle of the Francis turbine.

4(c) A centrifugal pump lifts water under static lift of 40 m of which 3 m is suction lift. The suction and delivery pipes are both of 35 cm diameters. The friction loss in suction pipe is 2.0 m and in delivery pipe it is 6.0 m. The impeller is 0.5 m in diameter and 3 cm wide at outlet and runs at a speed of 1200 rpm. The exit blade angle is 20°. If the manometric efficiency of the pump is 85%, determine the discharge and pressures at the suction and delivery ends of the pump.

4(d) Define and explain unit quantise for the hydraulic machines. Write short notes on characteristics and performance curves for a turbine.
2012-13
B.TECH. WINTER (VI SEMESTER) EXAMINATION
(CIVIL ENGINEERING)
TRANSPORTATION ENGINEERING
(CE-317)

Maximum Marks: 60
Credits: 04
Duration: Three Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No.  Question          M.M.
1(a)   Discuss in detail about the Lucknow Road Development Plan. [06]
1(b)   What do you understand by various sight distances? Obtain the expression for overtaking sight distance.

OR

1'(a)  Give reasons for providing extra widening of pavement on curves. Obtain the expression for the extra widening on curves.
(b)    Mention various IRC recommended values for (i) Camber (ii) Super elevation, and (iii) Extra widening on curves

2(a)   What are the important engineering properties of soil that are likely to influence the performance of road? Discuss.
2(b)   From the following data on a soaked sample of silty soil, determine the CBR value.

<table>
<thead>
<tr>
<th>Penetration (mm)</th>
<th>0</th>
<th>0.5</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>4.0</th>
<th>5.0</th>
<th>7.5</th>
<th>10.0</th>
<th>12.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load (kg)</td>
<td>0</td>
<td>4</td>
<td>16</td>
<td>28</td>
<td>40</td>
<td>50</td>
<td>55</td>
<td>67</td>
<td>75</td>
<td>89</td>
<td>99</td>
<td>116</td>
</tr>
</tbody>
</table>

OR

2'    List various types of bituminous construction. Discuss any of them in detail.
3    Discuss the steps for the design of rigid pavement as per IRC: 58-2002 recommendations.
4(a) Write short notes on following terms:
(i) Cross wind components
(ii) Run way orientation
(iii) Wind rose
(iv) Airport classification

4(b) The runway length required for landing and take-off at sea level in standard atmospheric conditions are 4.5 km and 3.5 km respectively. Aerodrome reference temperature is 25°C and that of standard atmosphere at aerodrome elevation of 200 m is 15.5°C. The effective gradient of the runway is 0.25%; determine the actual runway length to be provided.

5(a) What are the main functions of sleepers and stone ballast in Railway Tracks? Discuss different types of sleepers used in Indian Railways and determine the number of sleepers required for 10.5 km long broad gauge railway track having sleeper density of (n+6).

5(b) Define creep and gauge of a railway track, enumerate different types of gauges used in India and discuss their suitability at different locations. Why uniformity of gauges is necessary in any country?

OR

5'(a) What do you understand by points and crossings of railway track? Draw a neat sketch of right hand turn out and show its various component parts.

5'(b) Determine the mean tractive effort developed by an engine and check whether the working of engine is satisfactory or unsatisfactory from the following data:
(i) Wheel load = 3.5 tones
(ii) Difference in steam pressure = 4.5 kg/cm²
(iii) Dia. of piston = 40 cm
(iv) Length of stroke = 75 cm
(v) Dia. of wheel = 1.80 m
1(a) A continuous beam is loaded as shown in figure below. Determine the collapse load for the beam.

1(b) Find the value of $M_p$ for the portal frame shown in figure below.

**OR**

1(a) Calculate the shape factor for ISMB200. Also find the value of $M_p$ for this beam section if $f_y = 250$ MPa.
1(b) Determine the value of Plastic moment for the frame shown below.

\[
\begin{array}{c}
100\text{kN} \\
10\text{kN/m} \\
4\text{m} \\
6\text{m}
\end{array}
\]

2. Design a built up column of effective length of 4.5m to carry an axial load of 900kN using lacings. Design the connections using fillet welds. The grade of steel is E250.

\[\text{OR}\]

2'. Design a built up column with the battens for the data given in Q. No. 2. Use fillet welds for connection.

3. A 20m long simply supported welded plate girder is carrying a UDL of 50kN/m excluding its self weight and two concentrated loads of 350kN at quarter points of the span. The girder is laterally supported through out. The self weight of the plate girder may be taken as W/300, where W is total load on the girder. Design the cross section for an un-stiffened web. Check for the shear and moment capacity of the section. Assume yield strength of steel (for both flanges and web) as 250 MPa.

4(a) Design an angle section purlin for the following data

- Spacing of roof truss = 4.0m c/c
- Spacing of purlins = 1.8m c/c
- Pitch of the truss = 1/4.5
- Weight of G1 sheets = 133 N/m²

Wind load on the roof surface normal to the roof sheets is equal to 1500 N/m².

4(b) Determine the strength of an angle of a roof truss 15A 100×100×10mm, connected by 5#16mm bolts subjected to a load combination of dead load, live load and wind load. Take E250 (Fe410W) A.
UNIT – I

1. As the General Manager of Taj Group of Hotels across the metropolitan cities draft a letter addressed to J.P. Greens New Delhi, to spell out details of Terrace Gardening that they had advertised in all national dailies. They should mention the distinctive features along with estimated cost and duration of the work.

OR

Write an employment application and create a resume in response to the advertisement given below:

UNIT – II

2. Imagine a business situation and draft a text on any ONE of the following:

(a) Notice Inviting Tender.
(b) Press Release.
(c) Memo.

UNIT – III

3. Write an abstract or make notes of the passage given below:

Contd…..2
When it comes to success, a majority of people assume that making it to the top requires ethical compromises. As more and more scams get reported and cases of unethical behaviour revealed, it becomes all the more important for organisations to drive an ethical culture at the workplace.

So, is unethical behaviour becoming a norm in many organisations? According to Ajith KN, vice president and head – HR & FMS, Mytrah Energy (India) Limited, "India Inc's image has taken a real beating in the wake of many recent high-profile scandals. Unfortunately, the potential for individuals to behave unethically is limitless, but it is important that managers and organisations do not promote morally and ethically questionable practices. What is needed in today's turbulent times is for more organisations to come forward and operate with strong, positive and ethical cultures."

Talking about how work ethics play a major role in today's corporate world, Alex Augustine, VP - Corporate HR, CMS Info Systems Pvt Ltd explains, "You wouldn't sell a fake toy to a seven-year-old, would you? Most of us wouldn't and that is exactly how I feel organisations should respond when it comes to doing business. Studies have proven that customers are ready to pay a premium for products from organisations with sound ethics as values. You will also find potential employees preferring value-driven organisations." Similarly, W Michael Amick Jr, president, International Paper India, avers, "Regardless of the type of 'race' in order to compete successfully, one must finish the race. We believe and know that operating at any one's core principles builds the right foundation for successfully competing in this or any other race."

So, what are some of the key attributes needed for an organisation to be fully integrity-based? Values within the organisation need to be driven from the top, asserts Augustine. "Organisational leaders play a significant role in preaching and practising these values through their actions, which also demonstrate what they expect from their team members," he shares.

Ajith KN points out, "While it is important to include a code of ethics and conduct in the orientation of every employee, it is more important to imbibe the values into the organisational culture and help employees continuously remember and practise these values. This is possible by reinforcing and reiterating these values through effective reward and recognition mechanisms that encourage these positive behaviours."

The strength of a company's ethical culture lies in the extent to which the organisations makes doing the right thing a priority. Hence, it is imperative to continually share expectations and policies to create a clear understanding of acceptable and unacceptable behaviour at the workplace. This creates a culture where employees independently behave in an ethical manner. And if a zero-tolerance policy towards unethical practices is adhered to, the myth of nice guys finishing last will certainly be shattered.

UNIT – IV

4. You were recently interviewed for the post of Chief Engineer in Vile Parle Rain Water Harvesting Project at Mumbai. What were the questions that were asked and how did you answer them? Write both questions and answers in the form of a dialogue.

OR

Write the transcript of the recent Film Fare Award Function held in Goa.

UNIT – V

5. Generate a group discussion around any one of the following topics:

(a) To succeed in your mission, you must have single-minded devotion to your goal.

(b) Ego evaporates through Sacrifice.

(c) If one were to ever achieve the unachievable and become 'perfect', it would wipe out all excitement and anticipation from life.