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Eighth Semester B.E. Degree Examination, June/July 2016
Advanced Concrete Technology

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.**
2. Missing data may be suitably assumed.
3. Use of IS: 10262 – 2009 is permitted.

PART – A

- 1
 - a. Enumerate the importance of Bogue's compounds in ordinary port land cement. (06 Marks)
 - b. Explain briefly rheology of concrete. What are the factors affecting the rheology of concrete? (07 Marks)
 - c. What are the factors affecting strength and elasticity of concrete? (07 Marks)

- 2
 - a. Explain the mechanism of 'deflocculation' of cement particles by super plasticizers with neat sketches. (07 Marks)
 - b. What is optimum dosage of super plasticizer? How do you determine the optimum dosage of super plasticizer? (07 Marks)
 - c. What are mineral admixtures? Explain briefly, i) Silica fume ii) G.G.B.S. iii) Fly ash. (06 Marks)

- 3
 - a. Explain the factors affecting the mix design of concretes. (05 Marks)
 - b. Design a concrete mix of M₂₅ grade for the following data:
 Max size of aggregate – 20 mm; Crushed angular
 Min/max cement content – 300/450 kg/m³; Max W/C – 0.5; Exposure condition – Moderate;
 Work ability – 100 mm slump; Method of placing – pumping; Quality control – good;
 Type of chemical admixture – Super plasticizer [Specific gravity – 1.14].
 Assume 25% replacement of cement by fly ash.
 Test data for materials:
 i) Cement – OPC 43 grade IS 8112.
 ii) Specific gravity of cement – 3.15
 iii) Fly ash – 20% Cementations material
 iv) Specific gravity of fly ash – 2.20
 v) Specific gravity of coarse aggregate – 2.60
 vi) Specific gravity of fine aggregate – 2.65
 [belongs to zone II]
 Assume any other data suitably. (15 Marks)

- 4
 - a. Explain the influence of w/c ratio and age on permeability of concrete. (07 Marks)
 - b. Discuss in brief alkali aggregate reaction. What precautions are necessary to minimize? (06 Marks)
 - c. What is sulphate attack? Explain briefly the methods of controlling sulphate attack. (07 Marks)

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

PART – B

- 5 a. What is R.M.C? Explain briefly advantages of R.M.C. (06 Marks)
b. Explain short crete and under water concreting. (08 Marks)
c. What is self compacting concrete? What are the advantages of self compacting concrete? (06 Marks)
- 6 a. What are the different types of fibres used in concrete? What factors effecting properties of fibre reinforced concrete? (08 Marks)
b. What is aspect ratio? How does it influence strength and toughness of FRC? (04 Marks)
c. What is Ferro cement? List the various applications of Ferro cement. (08 Marks)
- 7 a. Write short notes on:
i) Light weight concrete. (06 Marks)
ii) High density concrete. (06 Marks)
b. What is 'High Performance Concrete' [HPC]? What are the applications of High Performance Concrete? (06 Marks)
c. Discuss in brief the properties of High Performance Concrete in fresh and hardened state. (08 Marks)
- 8 Explain the following:
a. Tests on hardened concrete. (08 Marks)
b. Rebound Hammer Test [NDT]. (06 Marks)
c. Pulse Velocity Test [NDT]. (06 Marks)

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Eighth Semester B.E. Degree Examination, June/July 2016
Design & Drawing of Steel Structures

Time: 4 hrs.

Max. Marks: 100

- Note: 1. Answer any ONE full questions from each part.**
2. Use IS: 800-2007 and steel table are permitted.
3. Missing data, if any may be suitably assumed.

PART – A

- 1 a. A cross beam ISLB-350 @ 495 N/m is connected to a main beam ISMB-500 @ 869 N/m. The top of the flanges are at same level. The framed connection has the following details:
- Frame angle – 2 ISA 150×115×10 @ 200 N/m.
 - The connection between the cleat angle leg of 115 mm and web of the cross beam is 5 mm fillet weld of length 250 mm.
 - The connection between the cleat angle leg of 150 mm and web of the main beam is 8 mm fillet weld of length 250 mm.
 - The clearance between cross beam and web of main beam is 10 mm.
- Draw to a suitable scale:
- ❖ Front view and
 - ❖ Side view with all details. (15 Marks)
- b. The design stiffened seated connection has the following details:
- ISHB-300@630 N/m transmits an end reaction of 80 kN to the flange of column section ISHB-250 @ 547 N/m.
 - Seat angle ISA 100×75×8 mm at 105 N/m, 100 mm along horizontal.
 - Stiffening angle 2ISA 90×90×8mm at 108 N/m.
 - Cleat angle at top ISA 75×75×8 mm at 89 N/m. Connect 2 – 18 mm dia in each leg.
 - Bolts connecting the stiffening angle with the column flange are 8 – 20 mm dia. HSFG bolts at a pitch of 60 mm C/C, 4 bolts in each row.
 - Stiffening angle are tack bolted.
- Use 2 – 18 mm dia bolts.
- Draw to a suitable scale:
- ❖ Front elevation
 - ❖ Side view. (15 Marks)
- 2 a. A built up column is composed of 2ISLC-350@388 N/m placed back to back at clear distance of 220 mm. The column is provided with single lacing system consisting of 60 ISF12 mm at 45° and is connected by a 20 mm dia bolt at each end. The channels are supported over a slab base 600×450×50mm. The angles connecting column and base plate is ISA 100×100×10 mm and are connected by 2-20 mm dia on each leg. Draw to a suitable scale:
- Sectional elevation.
 - Plan of slab base assembly with all details. (15 Marks)
- b. Draw to a suitable scale the elevation and plan of the column splice having the following details:
- Bottom column : ISHB – 300 @ 630 N/m
 - Top column : ISHB – 200 @ 400 N/m
 - Splice plate : 8 mm thick
 - Bearing plate : 50 mm
 - Use 8 – 20 mm dia on each side of the joint in two rows of 4 bolts each for connecting flanges of the columns to flange splice plate.
- Draw to a suitable scale :
- ❖ Sectional elevation
 - ❖ Side view with details. (15 Marks)

PART – B

- 3 A simply supported welded plate girder for an effective span of 30 m and a udl of 30 kN/m and two concentrated load of 150 kN each acting at 10 m from both ends. It is fully restrained against lateral buckling throughout the span. Design the central section using thin web with $K = 100$ and end bearing stiffener. Also design the welded connection between flange and web. Take $f_y = 250$ MPa, $f_u = 415$ MPa and ultimate stress of weld = 410 MPa. Also design curtailment of plate. (40 Marks)
- Draw to a suitable scale:
- Elevation for full span with discontinuous line. (10 Marks)
 - C/S at support and midspan. (10 Marks)
 - Plan for full span with discontinuous line. (10 Marks)
- 4 Design a simply supported crane girder for the following data. The girder is electrically operated. Take yield stress of steel is 250 N/mm². Use 16 mm dia. Bolts of grade 4.6. (40 Marks)
- Capacity of crane : 250 kN
 - Weight of crab (Trolley) : 80 kN.
 - Weight of crane girder excluding trolley : 300 kN
 - Span of the crane girder = 18 m.
 - Minimum hook approach = 1.0 m
 - Wheel base = 3.0 m
 - Span of gantry girder = 6 m
 - Weight of rail section = 0.25 kN/m
 - Take $f_y = 250$ MPa.
- Draw to a suitable scale showing all details:
- Plan of G.G. (05 Marks)
 - Front view (10 Marks)
 - Cross section of Gantry Girder. (15 Marks)

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Eighth Semester B.E. Degree Examination, June/July 2016
Industrial Wastewater Treatment

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

- 1 a. Distinguish between :
 - i) Domestic and industrial wastewater
 - ii) Stream standards and effluent standards. (08 Marks)
- b. Explain the effects of discharge of industrial wastewater on streams. (12 Marks)
- 2 a. Explain self purification of streams with sag curve. (10 Marks)
- b. A city discharges 100 cumecs of sewage into a river, which is fully saturated with oxygen and flowing at the rate of 1500 cumecs during its lean days with a velocity of 0.1 m/sec. The 5-days BOD of sewage at the given temperature is 280 mg/L. Find when and where the critical D.O. deficit will occur in the downstream portion of the river and what is its amount. Assume co-efficient of purification of stream as 4.0 and K_D as 0.1. (10 Marks)
- 3 a. What is meant by strength reduction? Explain the various methods of strength reduction. (10 Marks)
- b. What is neutralization of industrial wastewater? Explain the common methods adopted for neutralization. (10 Marks)
- 4 a. List and explain the methods of removal of colloidal solids. (10 Marks)
- b. Explain the method adopted for treatment and disposal of sludge solids. (10 Marks)

PART – B

- 5 a. Write an explanatory note on feasibility of combined treatment of industrial waste with domestic waste. (10 Marks)
- b. Explain the effects of discharge of raw and partially treated wastes to streams. (10 Marks)
- 6 a. Comment on the characteristics and treatment of wastewater from a sugar industry. (10 Marks)
- b. With the help of a line diagram explain the process of tanning industry highlighting the sources of wastewater generation. (10 Marks)
- 7 a. With the help of a flow diagram explain the treatment units suggested to treat wastewater from a steel industry along with wastewater characteristics. (10 Marks)
- b. State the origin and characteristics of the wastewater from dairy industry. (10 Marks)
- 8 a. With the help of a line diagram explain the process of paper and pulp industry highlighting the sources of wastewater generation. (10 Marks)
- b. Discuss the characteristics and treatment of wastewater from a pharmaceutical industry. (10 Marks)

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Eighth Semester B.E. Degree Examination, June/July 2016
Urban Transport Planning

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, selecting
at least TWO questions from each part.
2. Missing data, if any, may be suitably assumed.**

PART – A

- 1 a. Highlight various urban transport problems. Explain the essential differences between problem solving process and planning process. **(10 Marks)**
b. Explain the system approach to transport planning using a flow chart. **(10 Marks)**
- 2 a. Present a simplified flowchart to indicate various stages of urban transport planning. Explain the importance of setting goals and objectives with suitable examples. **(10 Marks)**
b. Describe the steps involved in travel estimation process with a suitable diagram. **(10 Marks)**
- 3 a. What is zoning? Explain the factors affecting zoning and how it will help the planning process. **(10 Marks)**
b. Mention the different types of transport surveys. Explain various inventories that are needed for providing transport facilities. **(10 Marks)**
- 4 a. Explain the various factors influencing trip production and attraction. Differentiate between aggregate and disaggregate approach. **(10 Marks)**
b. A neighborhood has 205 retail employees and 700 households that are categorized into four types with each having characteristics as follows :

Type	Household size	Number of house hold	Annual income (Rs)	Number of non-workers in peak hour	Number of workers in peak hour
1	2	100	40,000	1	1
2	3	200	50,000	2	1
3	3	350	55,000	1	2
4	4	50	40,000	3	1

Assuming that vehicle based trips for social/recreational and work all peak at the same time, determine the total number of peak hour trips for social/recreational and work trips using the following calibrated trip generation model.

$$T_1 = b_0 + 0.018x_1 + 0.009x_2 + 0.16x_3$$

Where T_1 = number of PH vehicle based social/recreational trips per house hold

x_1 = household size

x_2 = annual household income in thousand of rupees

x_3 = number of non-working household members

b_0 = calibration constant = 0.04.

(10 Marks)

PART – B

- 5 a. Highlight the differences between growth factor and synthetic methods of trip distribution. (10 Marks)
- b. Trip between zones of a proposed New town are assumed to be proportional to the trips produced by the zone of origin and trips attracted by the zone of destination and inversely proportional to the 2nd power of travel time between the zones. (10 Marks)

Zone	Trips produced	Trips attracted
A	3600	2400
B	2000	1600
C	5000	4000

Table Q5(b)(i)

Future Trips and travel times (min)

D \ O	A	B	C
A	–	–	X(12)
B	Y(10)	–	–
C	208(10)	Z(15)	–

Table Q5(b)(ii)

Table Q5(b)(i) – gives trip produced and attracted by respective zones

Table Q5(b)(ii) – gives future trips and travel times (in minutes)

Determine the correct values of x, y and z assuming that the constant of proportionality is the same for all zones. (10 Marks)

- 6 a. Differentiate between “tripend” and “trip interchange” models of modal split specify variables used. (10 Marks)
- b. A market segment consists of 600 individuals. A multinomial Logit mode choice model is calibrated, resulting in the following utility function $u = a_k - 0.30C - 0.02T$, where ‘C’ = is out of pocket cost in rupees,
T = is travel time in minutes
 a_k = mode specific constant
The attributes, specific to each mode is given in Table Q6(b). Predict the number of trips by each mode from this market segment.

MODE	a_k	C(Rs)	$T_{(min)}$
BUS	0	1.00	30
RAIL	0.40	1.50	20
AUTO	2.00	2.50	15

Table Q6(b)

(10 Marks)

- 7 a. List the various methods of route assignment. Explain any two methods. (10 Marks)
- b. Describe the structure of Lowry model using a flow chart. Explain the use of model for urban structure analysis. (10 Marks)
- 8 a. What are the difficulties in transport planning for small and medium cities? Suggest suitable traffic improvement strategies. (10 Marks)
- b. Describe briefly :
i) quick response techniques
ii) traffic restraint measures. (10 Marks)

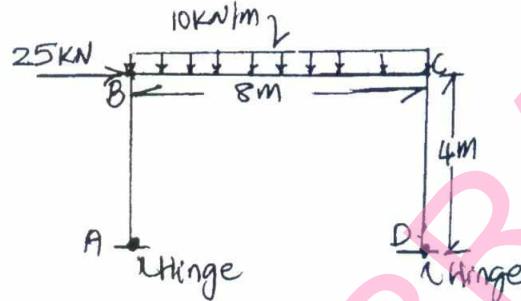
Eighth Semester B.E. Degree Examination, June/July 2016
Advanced Design of Steel Structures

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer FIVE full questions.**2. Use of IS800-2007, 806, 1161 and steel book is permitted.****PART – A**

- 1 a. Define the terms plastic hinge, shape factor and mechanism. (06 Marks)
 b. Explain the advantages and disadvantages of elastic and plastic analysis. (04 Marks)
 c. A portal frame is loaded upto collapse as shown in Fig.Q.1(c). Find the plastic moment capacity if it is uniform section throughout. (10 Marks)



A and D are hinged ends.

Fig.Q.1(c)

- 2 a. Explain the factors which affect the plastic moment capacity. (08 Marks)
 b. Explain the phenomenon of moment redistribution. (04 Marks)
 c. A box section is made up of 12mm plate throughout and is of size 300mm × 600mm. Determine the shape factor and plastic moment and capacity assuming the yield stress of the material as 250MPa. (08 Marks)
- 3 a. Explain upper and lower bound theorems in minimum weight. (06 Marks)
 b. Design the configurations beam shown below in Fig.Q.3(b) with cover plates wherever necessary. $\sigma_y = 260 \text{ N/mm}^2$. (plastic design). The loads on the beam are factored. The beam is laterally restrained. (14 Marks)

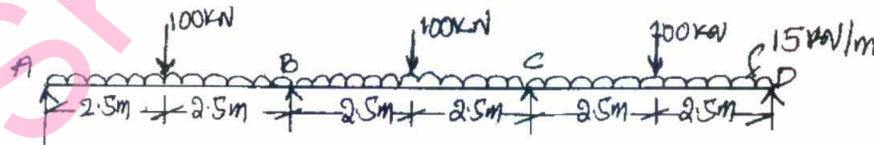


Fig.Q.3(b)

- 4 a. What are encased beams? Write a sketch with details of design. (10 Marks)
 b. Explain open web structures. Give their advantages and design methods. (10 Marks)

PART – B

- 5 a. Differentiate between semi rigid and rigid connections. (04 Marks)
 b. A beam ISMB300 transmits an end shear of 120 kN and a moment of 20 kN-m to the flange of a column ISHB200 @ 577 N/m. Using 20mm dia shop bolts, design suitable end connection. (16 Marks)

- 6 a. Explain the terms shear center and unsymmetrical bending. (06 Marks)
- b. Symmetric trusses of span 20m and height 5m are spaced at 4.5m center to center. Design channel section parlins to be spaced at 1.4m, c/c to resist the following loads:
Weight of sheeting including bolts = 171 N/m^2
Live load = 0.4 kN/m^2
Wind load = 1.2 kN/m^2 (suction). (14 Marks)
- 7 a. Explain the idealized stress-strain curve used in plastic analysis. (04 Marks)
- b. Explain the conditions to be satisfied in minimum weight design. (04 Marks)
- c. Explain how plastic design is advantages over elastic design. (04 Marks)
- d. Compute the central deflection at ultimate load for a fixed beam subjected to a udl over its entire span. (08 Marks)
- 8 Two members meeting at a joint at 30° inclination in a tabular truss carry 120kN compression and 36 kN tension. The length of compression member from center to center of joint is 2m. The members are made of IS1161 grade st.35 steel. Members are connected by weld. Design the members. (20 Marks)
