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10CV71

Seventh Semester B.E. Degree Examination, Dec.2013/Jan.2014

Environmental Engineering – II

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
2. Assume any missing data if necessary.**

PART – A

- 1 a. Explain the necessity and importance of sewerage system. (08 Marks)
b. Explain what do you mean by sewerage system and discuss relative merits and demerits of:
i) Separate system of sewerage ii) Combined system of sewerage. (08 Marks)
c. Explain the rational method of estimation of storm water. (04 Marks)
- 2 a. Explain the terms: i) Self cleaning velocity and non scouring velocity; (12 Marks)
ii) Infiltration and exfiltration
b. Design a sewer to serve a population of 36,000 the rate of water supply being 135 litres per capita per day of which 80% finds its way into sewer. The sewer are laid at a slope of 1 in 625 and sewer should be designed to carry three times dry weather flow when running full. $N = 0.012$. (08 Marks)
- 3 a. List the desirable characters of sewer material. List the sewer material commonly used. (06 Marks)
b. Briefly explain how the sewers are tested for leakage after laying. (04 Marks)
c. What are sewer appurtenances? List them and explain with a neat sketch any one of them. (10 Marks)
- 4 a. Explain BOD and discuss the advantages and limitation of BOD. (06 Marks)
b. Explain the concept of Aerobic and Anaerobic activity with respect to sewage treatment. (06 Marks)
c. The 5 day BOD at 30°C of a sewage sample is 120 mg/l. Calculate 5 days BOS at 20°C . Assume deoxygenation constant at 20°C , $K = 0.1/\text{day}$. (08 Marks)

PART – B

- 5 a. Explain with a neat figure the oxygen sag curve indicating the salient features related to self purification of streams. (10 Marks)
b. List the conditions favourable for on land disposal of sewage. (05 Marks)
c. A partially treated sewage from a town 1.7 million litres per day having BOD of 120 mg/l is to be discharged into a stream. The stream has a BOD of 10 mg/l, what should be minimum flow of the stream. (05 Marks)
- 6 a. Write the flow diagram employed for a conventional waste water treatment plant. Indicate the importance of each unit indicated in the flow diagram. (10 Marks)
b. Design a rectangular sedimentation tank for a population of 90 thousand with rate of water supply 140 litres per capacity per day, 80% of which reaches the treatment plant. Assume peak factor as 1.2 and horizontal velocity of flow 0.3 m/minute. Check for over flow rate. (10 Marks)
- 7 a. With a neat sketch, explain the working of a conventional trickling filter. (10 Marks)
b. Discuss the effect of recirculation in filters with figure. (04 Marks)
c. Define and explain the significance of sludge volume index and food to micro organism ratio. (06 Marks)
- 8 Write short notes on any four of the following:
a. Oxidation pond b. Sludge digestion c. Sewage sickness
d. Time of concentration e. Traps in house plumbing (20 Marks)

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

Seventh Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Design of Steel Structures

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.**
2. Use of IS 800 – 2007 and steel tables or permitted.

PART – A

- 1 a. Mention the failure criteria for steel sections. (05 Marks)
 b. Mention any four advantages and four disadvantages of steel structures. (08 Marks)
 c. Define : i) Design actions ii) Design strength
 iii) Compact and semi compact sections. (07 Marks)
- 2 a. Mention briefly types of failure of bolted connection, with sketches. (08 Marks)
 b. Determine the bolt value for M22, G5.6 property class bolts applied in double shear. Assume threads in shear plane. Bolts are used to connect angles to 10 mm thick gusset plate. (04 Marks)
 c. Determine the number of bolts required to connect two angles ISA 75 × 75 × 6 to 12 mm thick gusset plate of M20 – G4.6 property class bolts are used to connect system in Fig. Q2(c). Assume $f_y = 250$ MPa, $f_u = 410$ MPa. (08 Marks)

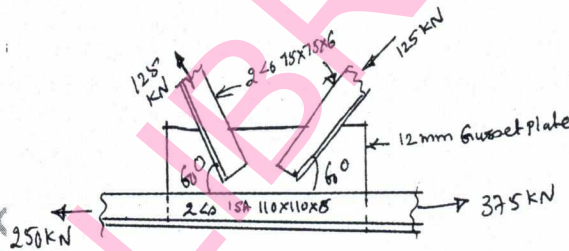


Fig. Q2(c)

- 3 a. Mention the different types of welds commonly used in structures for anyone of the types. (08 Marks)
 b. In a truss, angle ISA 100 × 100 × 8 mm is subjected to factored tension of 200 kN. It has to be connected to a gusset using fillet welds, at the toe and back. Determine the weld length required so that centre of gravity of welds lies in the plane of the centre of gravity of the angle if $f_u = 410$ MPa. (12 Marks)
- 4 a. Define : i) Plastic neutral axis ii) Elastic and plastic section modulus
 iii) Shape factor and load factor iv) Plastic hinge. (06 Marks)
 b. Mention any four advantages of plastic design. (04 Marks)
 c. Determine the position of plastic hinge from support B for the beam shown in Fig. Q4(c) and the magnitude of collapse load. (10 Marks)

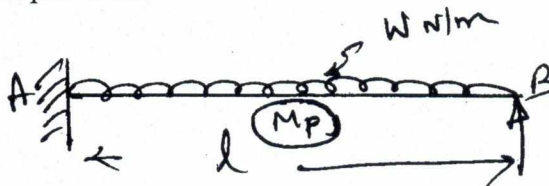
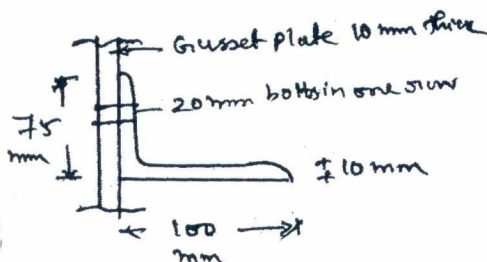


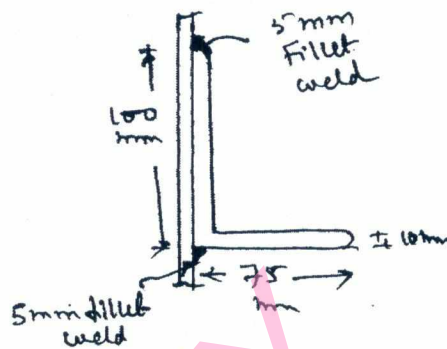
Fig. Q4(c)

PART – B

- 5 a. Classify Tension members commonly used based on types of structures and method of connections. (06 Marks)
 b. Determine efficiency of the Tension members shown in types Fig Q5(b)(i) and Fig. Q5(b)(ii).



Bolted Joint Fig. Q5(b)(i)



Welded Joint Fig. Q5(b)(ii)

Assume 200 mm as effective weld length for Fig. Q5(b). Assume yield strength and ultimate strength of steel as 250 MPa and 410 MPa. (14 Marks)

- 6 a. Briefly explain the design steps followed as per IS 800 – 2007 for designing. Compression members for
 i) A single discontinuous angles used in roof trusses
 ii) A continuous double angle strut places back to back on both sides of a gusset plate. (06 Marks)

- b. Determine design load capacity of a single discontinuous angle ISA 50 × 50 × 5 used as a compression member connected to a gusset by two bolts. Centre to centre distance between and connections is 1.5 m. adopt $f_y = 250$ MPa. (14 Marks)

- 7 a. What are column bases? Mention its types and explain design of any one type as per IS 800 – 2007. (06 Marks)

- b. Design a slab base for an ISHB 350@ 661.2 N/m (661.2) to carry factored load of 1000 kN. Adopt M25 concrete, Fe415 grade Steel for foundation. Adopt welding for the connection fo column to base plate. Indicate the details in a sketch. (14 Marks)

- 8 a. Explain briefly design steps followed while designing laterally supported beam as per Indian standards IS 800 – 2007. (06 Marks)

- b. Explain briefly web buckling and web crippling phenomena. (04 Marks)

- c. Determine : i) Design bending strength ii) Design shear strength iii) Intensity of udl the beam can carry under service conditions iv) Maximum deflection of a simply supported steel beam as shown in Fig. Q(c). Assume $f_y = 250$ Mpa. (10 Marks)

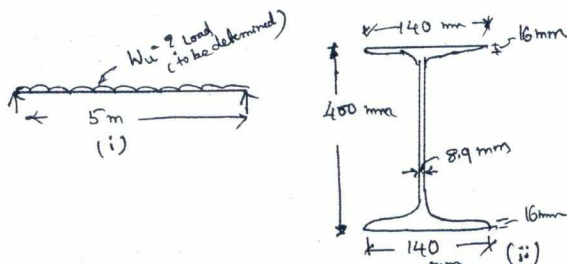


Fig. Q8(c)

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Seventh Semester B.E. Degree Examination, Dec.2013 / Jan. 2014
Estimation and Valuation

Time: 3 hrs.

Max. Marks:100

Note: 1. Question No. ONE is compulsory.
2. Answer FOUR questions selecting any TWO questions from each Part B and Part C.

PART - A

- 1 Prepare a detailed estimate for a residential building shown in fig. Q1 for the following items of work.
- Earthwork excavation @ Rs 100/m³.
 - Size stone masonry in CM 1:5 @ Rs 2150/m³.
 - First class brick work in superstructure in CM 1:6 @ Rs 3700/m³.
 - R.C.C roof concreting @ 3500 Rs/m³.
- (40 Marks)

PART - B

- 2 Prepare a detailed estimate of a septic tank with soak pit shown in fig. Q2 for the following items of works.
- Earth work in excavation.
 - 1st class Brick work.
 - 12mm thick C.M plastering of walls.
- (15 Marks)
- 3
- What is an estimate? Explain the different types of estimates. (08 Marks)
 - Briefly explain different types of contracts. (07 Marks)
- 4 Write the detailed specification for any 3 of the following :
- 1st class brick work in CM (1:6).
 - Cement plastering in CM (1:6).
 - Earth work excavation.
 - 25cm thick cement concrete flooring of 1:2:4.
- (15 Marks)

PART - C

- 5 Carry out the rate analysis for any 3 of the following :
- Given : Basic rates of materials as cement = 320Rs / bag ; sand = 120 Rs /Cu.m ;
 C aggregate = 750Rs /Cu.m.
- C.C of 1:5:10 for bed in foundation.
 - Random rubble masonry in CM of 1:6 in foundation.
 - Brick masonry in CM of 1:6 in superstructure.
 - 6mm thick cement plastering of 1:3 to RCC ceiling.
- (15 Marks)
- 6 Determine the quantities of earth work in mid section method for the portion of a road between chainages 10 to 20. RL of ground along the centre line are given below. The formation level at the 10th chainage is 107 and formation width of road is 10m and the side slope of banking are 2:1. Length of the chain is 30m. The road is of down ward gradient 1 in 150 up to chainage 14 and then the downward gradient changes to 1 in 100 and also prepare an estimate of earthwork at the rate of Rs 275/m³.

Chainage	10	11	12	13	14	15	16	17	18	19	20
RL of ground	105	105.6	105.44	105.9	105.42	104.3	105	104.1	104.62	104	103.3
RL of formation level	107										
Gradient	← Down gradient of 1 in 150 →					← Down gradient of 1 in 100 →					

(15 Marks)

7 Write short notes on any 3 of the following :

- Tender and Tender notice.
- Measurement book and schedule of rates.
- Earnest money deposit and security deposit.
- Valuation and different methods of valuation.

(15 Marks)

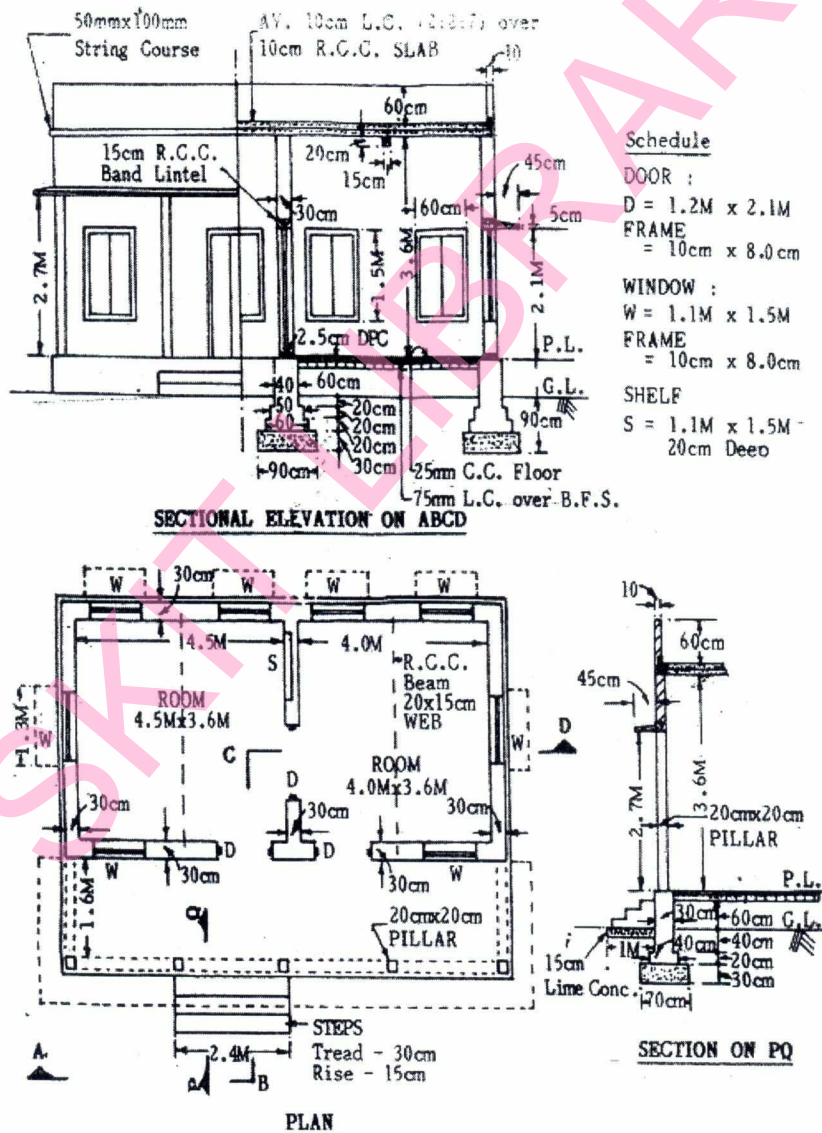


Fig.Q1.

SEPTIC TANK FOR 25 USERS

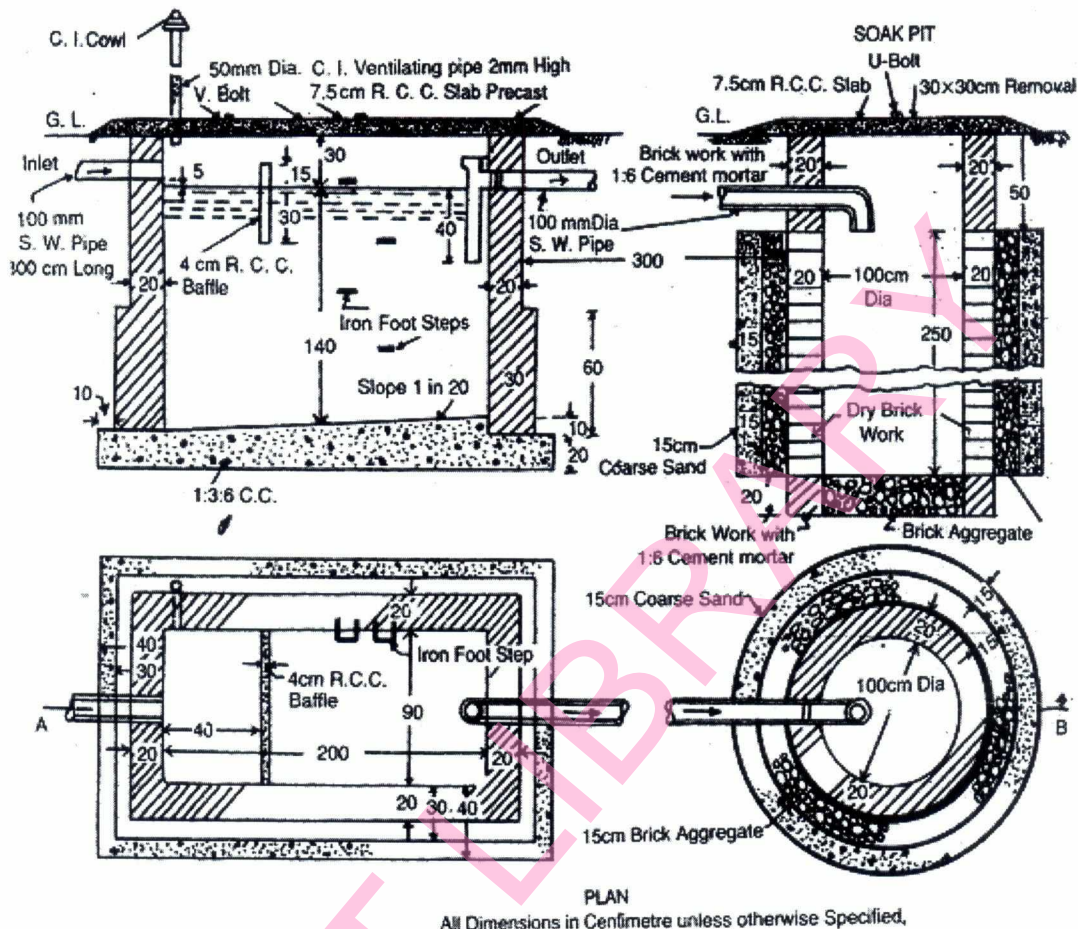


Fig.Q2.

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Seventh Semester B.E. Degree Examination, Dec.2013/Jan.2014
Design of Prestressed Concrete Structures

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer FIVE full questions, selecting at least TWO questions from each part.
 2. Use of IS1343-1930 is permitted.
 3. Assume any missing data suitably.

PART – A

1.
 - a. Explain the concept of using high strength concrete and high strength steel in PSC structures. (05 Marks)
 - b. What are the advantages of prestressed concrete structures compared to R.C.C. structures? (05 Marks)
 - c. With neat sketches explain pre tensioning and post tensioning. State the advantages of these methods. (10 Marks)

2.
 - a. With a neat sketch, explain Hoyes system of prestressing. (04 Marks)
 - b. A rectangular concrete beam of cross section 30cm deep and 20cm wide is pre-stressed by means of 15wires of 5mm diameter located 6.5cm from the bottom of the beam and 3 wires of diameter of 5mm, 2.5cm from the top. Assuming the pre-stress in the steel as 840 N/mm^2 , calculate the stresses at the extreme fibres of the midspan section when the beam is supporting its own weight over a span of 6m. If a uniformly distributed live load of 6 kN/m is imposed, evaluate the maximum working stress in concrete the density of concrete is 24 kN/m^3 . (16 Marks)

3.
 - a. What are the important losses of prestress? Explain in detail. (10 Marks)
 - b. A rectangular concrete beam, 300mm deep and 200mm wide is prestressed by means of fifteen 5mm diameter wires located 65mm from the bottom of the beam and three 5mm wires, located 25mm from the top of the beam. If the wires are initially tensioned to a stress of 840 N/mm^2 , calculate the percentage loss of stress in steel immediately after transfer, allowing for the loss of stress due to elastic deformation of concrete. Take $E_s = 210 \text{ kN/mm}^2$ and $E_c = 31.5 \text{ kN/mm}^2$. (10 Marks)

4.
 - a. List the factors influencing deflections. (04 Marks)
 - b. A concrete beam with a cross sectional area of $32 \times 10^3 \text{ mm}^2$ and radius of Gyration of 72mm is prestressed by a parabolic cable carrying an effective stress of 1000 N/mm^2 . The span of the beam is 3m. The cable composed of 6 wires of 7mm diameter, has an eccentricity of 50mm at the centre and zero at the supports. Neglecting all losses, find the central deflection of the beam for the following cases:
 - i) Self weight + pre-stress; ii) Self weight + pre-stress + live load of 2 kN/m . (08 Marks)
 - c. A pre-stressed concrete beam of rectangular section 120mm wide and 300mm deep, spans over 6m. The beam is prestressed by a straight cable carrying an effective force of 180kN at an eccentricity of 500mm. If it supports an imposed load of 4 kN/m and the modulus of elasticity of concrete is 38 kN/mm^2 . Compute the deflection at the following stages and check whether they comply with the IS code specifications:
 - i) Upward deflection under (pre-stress + self weight) and
 - ii) Find downward deflation under (pre-stress + self weight + imposed load) inducing the effects of creep and shrinkage. Assume the creep coefficient to be 1.80. (08 Marks)

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

PART – B

- 5 a. List and explain the types of flexural failure. (08 Marks)
- b. A pre-tensioned prestressed concrete beam having a rectangular section 150mm wide and 350mm deep has an effective cover of 50mm. If $f_{ck} = 40 \text{ N/mm}^2$, $f_p = 1600 \text{ N/mm}^2$ and the area of pre-stressing steel $A_p = 461 \text{ mm}^2$, calculate the ultimate flexural strength of the section using IS:1343 code provisions. (07 Marks)
- c. A post-tensioned beam with unbounded tendons is of rectangular section 400 mm wide with an effective depth of 800 mm. The cross sectional area of the pre-stressing steel is 2840 mm^2 . The effective pre-stress in the steel after all losses is 900 N/mm^2 . The effective span of the beam is 16m. If $f_{ck} = 40 \text{ N/mm}^2$ estimate the ultimate moment of resistance of the section using IS:1343 code recommendations. (05 Marks)
- 6 a. List and explain the types of shear cracks in structural concrete. (08 Marks)
- b. The support section of a pre-stressed concrete beam 100mm wide and 250mm deep, is required to support an ultimate shear force 60kN. The compressive pre-stress at the centroidal axis is 5 N/mm^2 the characteristic cube strength of concrete is 40 N/mm^2 . The cover to the tension reinforcement is 50mm. If the characteristic tensile strength of steel in stirrups is 250 N/mm^2 , design suitable reinforcements at the section using the Indian standard code IS:1343 recommendations. (06 Marks)
- c. The cross section of a pre-stressed concrete beam is rectangular with a width of 350mm and an overall depth of 700mm. The prestressing force of 180kN acts at an eccentricity of 190mm. If the bending and twisting moments at the section are 80 and 20kN-m respectively. Calculate the maximum principal tensile stress at the section. (06 Marks)
- 7 a. Explain the concept of stress distribution in End block. (08 Marks)
- b. The end block of a post tensioned pre-stressed member is 550mm wide and 550mm deep. Four cables each made up of 7 wires of 12mm diameter strands and carrying a force of 1000 kN are anchored by plate anchorages 150mm by 150mm, located with their centres at 125mm from the edges of the end block. The cable duct is of 50mm diameter the 28day cube strength of concrete f_{ck} is 45 N/mm^2 . the cube strength of concrete at transfer f_{ci} is 25 N/mm^2 . Permissible bearing stresses behind anchorages should conform with IS1343. The characteristic yield stress in mild steel anchorage reinforcement is 260 N/mm^2 . Design suitable anchorage for the end block. (12 Marks)
- 8 Design a pre-tensioned roof Purlin to suit the data below: Effective span = 6m, applied load = 5 kN/m , load factors: for dead load = 1.4, for live load = 1.6, concrete cube strength, $f_{cu} = 50 \text{ N/mm}^2$, cube strength at transfer $f_{ci} = 30 \text{ N/mm}^2$, tensile strength of concrete, $f_t = 1.7 \text{ N/mm}^2$, modulus of elasticity of concrete, $E_c = 34 \text{ kN/mm}^2$, loss ratio, $\eta = 0.8$, permissible stresses: at transfer :
 compressive stress, $f_{ct} = 15 \text{ N/mm}^2$,
 tensile stress, $f_{tt} = -1 \text{ N/mm}^2$,
 at working load : compressive stress $f_{cw} = 17 \text{ N/mm}^2$, tensile stress $f_{tw} = 0$.
 7mm high tensile steel wires having an ultimate tensile strength, $f_{pu} = 1600 \text{ N/mm}^2$ are available for use. (20 Marks)

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Seventh Semester B.E. Degree Examination, Dec. 2013/Jan. 2014

Solid Waste Management

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. With neat schematic diagram, explain the functional elements of the solid waste management. (10 Marks)
- b. List the physical and chemical characteristics of solid waste. (04 Marks)
- c. Estimate the density of a solid waste sample, on as discarded basis. Take 1000 kg sample

Component	% by mass	Density (typical) (kg/m ³)
Food waste	20	300
Paper	40	100
Plastics	5	90
Garden trimmings	15	150
Wood	5	250
Tin cans	5	100
Card board	10	80

(06 Marks)

- 2 a. With neat schematic diagram, explain :
i) Hauled container system
ii) Stationary container system. (10 Marks)
- b. Explain the factors that must be considered in the design of transfer station. (10 Marks)
- 3 a. Explain the following processing techniques, briefly :
i) Mechanical volume reduction
ii) Mechanical size reduction. (10 Marks)
- b. Explain the following component separation techniques :
i) Magnetic separation
ii) Air separation
iii) Hand sorting. (10 Marks)
- 4 a. With neat sketch, explain the working of conventional municipal solid waste incinerator. (10 Marks)
- b. Explain 3T's of incineration process. (05 Marks)
- c. Define pyrolysis? Briefly explain the process of pyrolysis. (05 Marks)

PART – B

- 5 a. Discuss the important factors considered in the anaerobic composting process design. (10 Marks)
- b. Explain the following composting methods : (10 Marks)
- Bangalore method
 - Indore method.
- 6 a. With neat sketch, explain the trench method of sanitary land filling. (06 Marks)
- b. Determine the landfill area required for a municipality with a population of 60000 and with the given following details : (06 Marks)
- Solid waste generation = 2000 gm/ person/ day
 - Compacted density of solid waste in land fill = 600 kg/m³
 - Average compacted depth of solid waste = 3 m.
- c. List and explain briefly the various factors that must be considered in evaluating a potential land fill site. (08 Marks)
- 7 a. List out the various methods of disposal of solid waste. Describe briefly the method – feeding to hogs. (08 Marks)
- b. What are the factors affecting the selection of site of open dumping? (06 Marks)
- c. What are the advantages and disadvantages of the ocean disposal of solid waste? (06 Marks)
- 8 Write short notes on the following : (20 Marks)
- Reuse and recycling of plastic waste
 - Vermicomposting
 - Material recovery from solid waste
 - Garbage chutes.

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10CV765

Seventh Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Air Pollution and Control

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Define air pollution. Explain primary and secondary air pollutants, with examples. (10 Marks)
b. Write a note on emission source classification of air pollutants. (10 Marks)
- 2 a. What are the harmful effects of polluted air on human being? (10 Marks)
b. List the air pollutants affecting plants. Write a brief note on Bhopal gas tragedy. (10 Marks)
- 3 a. What is inversion? Explain efferent type of inversion. (10 Marks)
b. Explain with neat sketches, how plumes behave in different atmospheric conditions. (10 Marks)
- 4 a. Explain the factors influencing the industrial plant location and planning. (10 Marks)
b. Define noise. Discuss in brief the various sources of noise. Write a brief note on noise abatement and control. (10 Marks)

PART – B

- 5 a. Describe the sampling train, with the help of neat sketch. (10 Marks)
b. Explain the procedure for measurement of suspended particulate matter (SPM) in ambient air using high volume air sampler, with a neat sketch. (10 Marks)
- 6 a. Explain the control of air pollutants by the use of the “Cyclone separators” control device, with neat sketches. (10 Marks)
b. Explain with a neat sketch, the principle and construction of fabric filter, give applications. (10 Marks)
- 7 a. Explain air pollution due to gasoline and diesel vehicles. (10 Marks)
b. Discuss the phenomena of acid rain and its effects. (10 Marks)
- 8 Write short notes on the following :
 - a. Global warming
 - b. Ozone layer depletion
 - c. Indoor air pollution
 - d. Ambient air quality standards. (20 Marks)

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2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.