

- 6 a. Write a 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 1.5 lakh, with an assured water supply of 135 ℓ pcd. Assume peak factor as 1.2, flow velocity = 0.3 m/min. (10 Marks)
- 7 a. Explain the importance of screens and types of screens in the sewage treatment process. (10 Marks)
- b. Explain with a neat sketch the working of a trickling filter. (10 Marks)
- 8 Write notes on:
- a. Septic tank
- b. Sludge digestion process
- c. Oxidation ditch
- d. Low cost waste water treatment methods. (20 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2019
Design of Steel Structures

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1
 - a. Outline the differences between working stress method and limit state method. (06 Marks)
 - b. State and expression the design actions to be considered in the design of steel structures. (06 Marks)
 - c. List the advantages and disadvantages of steel structures. (08 Marks)

- 2
 - a. Explain with neat sketch, the types of failure in bolted connection. (06 Marks)
 - b. Determine the strength and efficiency per pitch of the double bolted lap joint connecting two plates of Fe410 grade with one plate having thickness of 10mm and other plate having thickness of 14mm, with 40mm edge distance and pitch of 50mm. The bolts used are 18mm diameter of class 4.6 with fully threaded. (06 Marks)
 - c. Design bolted connection between flange of the column ISHB450@907.4 N/m and bracket plate. The bracket plate carries a load of 150 kN at an eccentricity of 350mm. Adopt HSFG bolts of 24mm diameter and class 8.8. Assume pitch of bolt 60mm and distance between two rows as 140mm. (08 Marks)

- 3
 - a. Outline few advantages and disadvantages of welded connection. (05 Marks)
 - b. Solve a welded connection for a tension member consisting of ISMC300@ 351.2N/m to carry a load equal to full strength of the member, the length of joint is limited to 250mm (Take size of weld 6mm). (05 Marks)
 - c. A bracket plate of thickness 16mm, is welded to the flange of column ISHB400@759.3 N/m. If the size of weld is 8mm, compute the reaction that can be allowed on the bracket in Fig.Q3(c). (10 Marks)

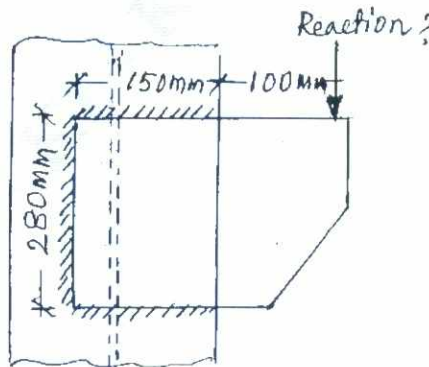


Fig.Q3(c)

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.

- 4 a. Define the terms, plastic hinge, rotational capacity, collapse mechanism, shape factor and upper bound theorem. (05 Marks)
- b. Compute the shape factor for an equilateral triangle of base 'B' and height H. (05 Marks)
- c. Determine plastic moment capacity for the beam shown in Fig.4(c). Take factor load of 1.5. (10 Marks)

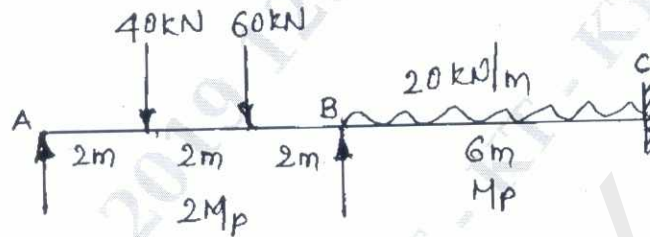


Fig.Q4(c)

PART – B

- 5 a. What is Lug angle? Why it is used and what are the design requirements. (04 Marks)
- b. Design a tie member to carry an axial load of 400 kN (working load). Use double angle with M_{20} HSFG bolts property class 10.9. Take $\mu_f = 0.55$. (08 Marks)
- c. Determine tensile strength of a tie member 2ISA 80 × 80 × 80mm connected to a gusset plate on either side using 6mm fillet weld. The length of weld is 100mm and 80mm. (08 Marks)
- 6 a. Design a single angle section for a discontinuous strut to carry a load of 100kN, if the length of member is 2.5meter. (10 Marks)
- b. Design a compression member using double channel section face to face to carry a factored load of 1500kN. The length of column is 4.5m with one end fixed and other end higher. Also design lacing. (10 Marks)
- 7 a. Design a slab base for column ISHB@576.8N/m, subjected to carry working load of 1000kN. The grade of concrete for pedestal is M_{20} and SBC of soil is 180kN/m^2 . Also design a concrete base. (08 Marks)
- b. Design a gusseted base and concrete pedestal for a column to carry an factored axial load of 2750kN. The column is ISHB400@759.3N/m with two cover plates 250 × 20mm on either side. The column is to be supported on concrete pedestal of M_{20} grade. Assuming 5.6 property class with nominal diameter of 22mm. (12 Marks)
- 8 a. Distinguish between laterally restrained and unrestrained beams. (Write sketches required). (06 Marks)
- b. A hall measuring 5 × 12m consists of 120mm thick RCC slab supported on steel I – section spaced at 3m c/c. Take live load 3.5kN/m^2 and finishes 1.5kN/m^2 . Bearing of wall = 400mm, the beam is laterally restrained. Design one of the interior beam and check the design for deflection, web buckling and web crippling. (14 Marks)

Seventh Semester B.E. Degree Examination, June/July 2019
Estimation and Valuation

Time: 3 hrs.

Max. Marks:100

Note: 1. Question no. 1 is compulsory.
2. Answer any FOUR full 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:
- | | |
|---|------------|
| (i) Centre line calculations | (05 Marks) |
| (ii) Earthwork in excavation for foundation @ Rs. 150/m ³ | (06 Marks) |
| (iii) Size stone masonry in C.M 1:6 for foundation and basement @ Rs. 3250/m ³ . | (09 Marks) |
| (iv) R.C.C. floor slab in C.C. 1 : 2 : 4 @ Rs. 6300/m ³ . | (06 Marks) |
| (v) Plastering in C.M 1:4 for wall inside @ Rs. 200/m ² | (09 Marks) |
| (iv) Total cost abstract of above items. | (05 Marks) |

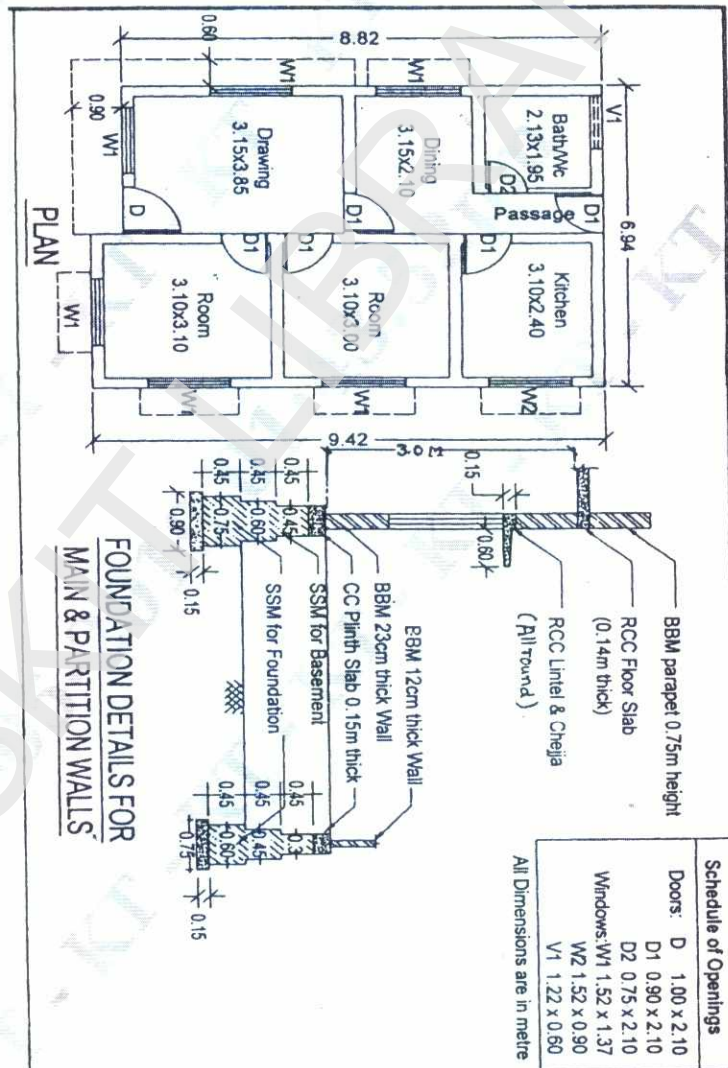


Fig.Q1

PART – B

- 2 The details of a septic tank are given in Fig.Q2. Find the quantities of the following items.
- Earthwork in excavation for foundation in hard soil
 - BBM in CM 1:4 for side walls
 - P.C.C. 1:2:4 for cover slab

(15 Marks)

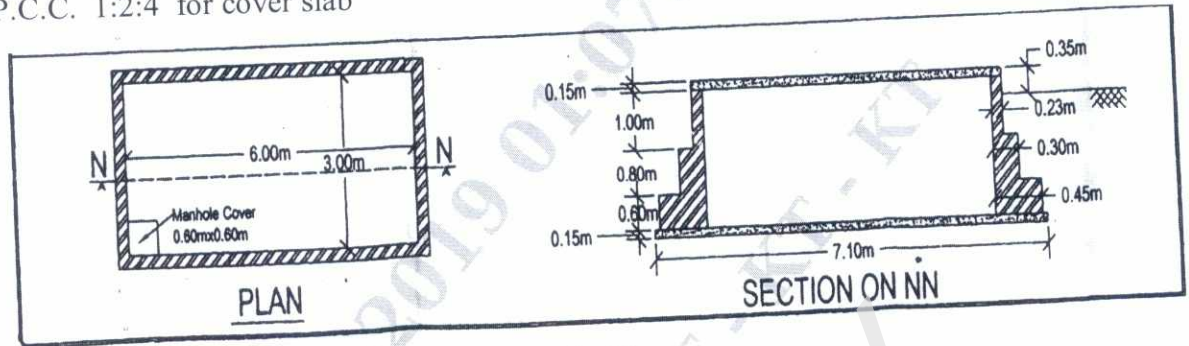


Fig.Q2

- 3 a. What is an estimate? Explain the different types of estimate. (08 Marks)
 b. Briefly explain different types of Area considered in estimation. (07 Marks)
- 4 Write detailed specification for any three of the following :
- Earthwork in excavation in foundation
 - First class brickwork in CM 1:5
 - R.C.C. 1 : 1½ : 3 for Roof slab
 - Painting on woodwork.

(15 Marks)

PART – C

- 5 Workout from the first principles the rate per unit of any three of the following :
- Cement concrete in foundation in C.C. 1:3:6.
 - Coursed rubble stone masonry in C.M 1:6 for foundation
 - R.C.C. 1:2:4 for Roof slab
 - 12mm thick internal plastering in C.M 1:4 for wall.
- (15 Marks)
- 6 Estimate the cost of earthwork for a portion of the road from the following data. Formation width of the road is 10.0 m side slopes are 2:1 in filling and 1.5:1 in cutting compute the volume by "Mean area method".

Chainage in 'm'	600	630	660	690	720	750	780	810	840	870	900
RL of ground	71.20	71.25	70.9	71.25	70.80	70.45	70.20	70.35	69.10	69.45	69.70
RL of formation	70.0	← Rising gradient of 1 in 200 →									

(15 Marks)

- 7 Write short notes on any Three of the following :
- Tender and Tender notice
 - Earnest money deposit and Security money deposit
 - What is Depreciation? Mention different methods of determining depreciation.
 - What is contract? Explain different types.

(15 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2019
Design of Prestressed Concrete Structures

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.**
2. Use of IS:1343-1980 is permitted.
3. Assume any suitable missing data.

PART – A

- 1 a. What is the necessity of using high strength concrete and high steel in prestressed concrete? (08 Marks)
 b. Differentiate between pretensioning and post tensioning. (05 Marks)
 c. What are the factors influencing the creep and shrinkage of concrete. (07 Marks)
- 2 a. What is pressure line or thrust line? Explain its significance with sketches. (06 Marks)
 b. A concrete beam of symmetrical I section supports a superimposed load of 3 kN/m over a span of 8m. It is prestressed by a cable carrying a force of 120 kN at an eccentricity of 150mm at midspan section. The bottom and top flanges of the I – beam are 250mm wide and 80mm deep, thickness of the web is 80mm and overall depth is 450mm. Determine the resultant stresses at midspan section for the following cases:
 (i) Prestress + Self weight
 (ii) Prestress + Self weight + live load
 Neglect the loss, Density of concrete = 24 kN/m³. (14 Marks)
- 3 a. List the various types of loss of prestress in pretensioned and post tensioned members and write equations used to calculate the losses. (06 Marks)
 b. In a prestressed pretensioned concrete beam of c/s 200mm × 300mm depth and span of 6 m, with an initial pre-stressing force of 400kN, at an eccentricity of 70mm by tendons of area 400mm². Assume $E_s = 2 \times 10^5$ N/mm², and $E_c = 0.33 \times 10^5$ N/mm², creep coefficient is 2 shrinkage of concrete = 0.0002 and relaxation in steel = 3% of initial stress. Find the percentage loss in prestress. (14 Marks)
- 4 a. Distinguish clearly between short term and long term deflections of prestressed concrete beams. (06 Marks)
 b. The deck of a prestressed concrete culvert is made up of a slab 500mm thick. The slab is spanning over 10.4m and supports uniformly distributed load comprising the dead and live loads of 33.5 kN/m². The modulus of elasticity of concrete is 38 kN/mm². The concrete slab is prestressed by straight cables each containing 12 high-tensile wires of cables are spaced at 328mm intervals in the transverse direction. Estimate the instantaneous deflection of the slab at centre of span under prestress and imposed loads. (14 Marks)

PART – B

- 5 a. What are the different flexural failure modes observed in prestressed concrete beams? Explain with neat sketches. (08 Marks)

- b. A post-tensioned prestressed Tee beam having a flange width of 1200mm and flange thickness of 200mm, thickness of web being 300mm is prestressed by 2000mm² of high tensile steel, located at an effective depth of 1600mm. If $f_{ck} = 40 \text{ N/mm}^2$ and $f_p = 1600 \text{ N/mm}^2$, estimate the flexural strength of the unbonded Tee section, assuming span/depth ratio as 20 and $f_{pc} = 1000 \text{ N/mm}^2$. (12 Marks)
- 6 a. Distinguish between web shear, flexural-shear cracks in concrete beam with sketches. (05 Marks)
- b. A prestressed concrete beam, span = 10m of rectangular section, 120mm wide and 300mm deep, is prestressed by force of 180 kN. The beam supports a total uniformly distributed load of 5 kN/m which includes self weight of the member. Compare the magnitude of the principal tension developed in the beam, for the following cases.
 (i) with axial prestress
 (ii) without axial prestress
 (iii) with parabolic cable having max eccentricity of 100mm at the centre of span and zero at the supports. (15 Marks)
- 7 a. What is transmission length? List the various factors influencing transmission length. (06 Marks)
- b. The end block of a post tensioned beam is 80mm wide and 160mm deep. A prestressing wire, 7mm in diameter, stressed to 1200 N/mm² has to be anchored against the end block at the centre. The anchorage plate is 50mm by 50mm. The wire bears on the plate through a female cone of 20mm diameters. Given the permissible stress in concrete at transfer f_{ci} as 20 N/mm² and the permissible shear in steel as 94.5 N/mm², determine the thickness of the anchorage plate. (14 Marks)
- 8 a. Write a short note on limiting zone for cables in PSC. (06 Marks)
- b. A prestressed concrete beam of rectangular section 90mm wide and 180mm deep is to be designed to support two loads of 3.5kN each located at one third points over a span of 3m. The tensile stress is not permitted both at transfer and working stage. Calculate the minimum prestressing force and the corresponding eccentricity loss factor as 0.8. (14 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2019
Highway Geometric Design

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Explain the objects of Highway Geometric Design and list all the elements in it. (10 Marks)
 b. Write a note on Design speed. Mention the IRC recommended values with a neat sketch. (10 Marks)
- 2 a. Explain in detail, the significance of pavement surface characteristics in Highway Geometric Design. Also explain the factors affecting skid resistance. (08 Marks)
 b. List the various objectives for providing (i) Medians (ii) Kerbs (06 Marks)
 c. Write a note on Road humps, indicating the design as per IRC standards. (06 Marks)
- 3 a. With a neat sketch, explain the factors affecting safe sight distance at intersections. (06 Marks)
 b. Calculate the SSD for a vehicle having design speed of 100 kmph on a level road, upgrade of 2% and downgrade of 2%. (06 Marks)
 c. Explain the importance of overtaking zone? Draw a neat sketch, indicating overtaking zones with suitable sign post position. (08 Marks)
- 4 a. Find the total width of a pavement on a horizontal curve for a new National highway to be aligned along a rolling terrain with a ruling minimum radius from the following data:
 Design speed = 80 kmph, Number of lanes = 2, Normal pavement width = 7 m, Length of wheel base. (08 Marks)
 b. Calculate the set-back distance on a National highway having a horizontal curve of radius 300m and length 180m. Assume a speed of 80 kmph and coefficient of friction of 0.35. (06 Marks)
 c. Derive an expression for providing extra widening of pavement on a horizontal curve. (06 Marks)

PART – B

- 5 a. What is critical length of Gradient? Explain. Find the grade compensation for a Radius of 50m if the limiting gradient is 5%. (06 Marks)
 b. Derive an equation for length of valley curve for (i) Comfort condition (ii) Headlight sight distance when (i) $L > SSD$ (ii) $L < SSD$. (08 Marks)
 c. An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. A summit curve is to be designed for a speed of 80 kmph so as to have an overtaking sight distance of 470 metres. (06 Marks)
- 6 a. Briefly explain the channelized and unchannelized intersections and their advantages and disadvantages. (12 Marks)
 b. Write a note on gap in median at junctions. (08 Marks)

- 7 a. Explain briefly the various components of a rotary with neat sketch. What are the different shapes adopted? (10 Marks)
- b. Draw neat sketches of (i) Diamond crossing (ii) Half cloverleaf and list any two advantages of each. (10 Marks)
- 8 a. What are the requirements of highway drainage system? (06 Marks)
- b. Write the procedure for design of filter material for subsurface drainage system for road pavements. (06 Marks)
- c. A longitudinal channel with a trapezoidal cross section is to be constructed in a cut section. The longitudinal slope is 1 in 2500. The soil is clay, with Manning's Rugosity coefficient of 0.024. The maximum allowable velocity is 0.6 m/s. Design the channel for a discharge of 3 cu m/sec. (08 Marks)

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10CV757

Seventh Semester B.E. Degree Examination, June/July 2019
Solid Waste Management

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Explain the classification of Municipal solid waste. (10 Marks)
 b. Estimate the energy content of solid waste sample, with the following composition. Assume moisture content = 21% , Ash content = 5%. What is the energy content on dry basis and on ash free dry basis? (10 Marks)

Component	Food waste	Paper	Card board	Plastic	Garden Trimming	Wood	Tin cans
% by mass	15	45	10	10	10	05	05
Energy content kJ/kg	4650	16750	16300	32600	6500	18600	700

- 2 a. Explain briefly the factors affecting the generation of solid waste. (08 Marks)
 b. From the following data estimate the waste generation rate per day for a residential area consisting of 1200 houses. The observation location is a local transfer station that receives all the waste collected for disposal. The observation period is for one week. Also estimate per capita generation rate assuming 4 persons per house. (06 Marks)

Vehicle Type	No. of loads	Volume of vehicle (m ³)	Specific weight of solid waste (kg/m ³)
Compactor truck	10	15.30	296.5
Flat bed load	08	1.53	133.4
Private cars/trucks	25	0.23	88.9

- c. Explain with neat sketch, the operational task adopted with hauled container system in collection process of municipal solid waste. (06 Marks)
- 3 a. Explain the parameter 3T's factor affecting the incineration process. (10 Marks)
 b. What is Pyrolysis? Briefly explain the process of pyrolysis. (10 Marks)
- 4 a. Explain briefly the processing techniques involved in the treatment of municipal solid waste as well as material recovery. (10 Marks)
 b. Explain briefly, the different techniques of component separation.
 i) Garbage chute ii) Route optimization technique. (10 Marks)

PART – B

- 5 a. Discuss the factors affecting the anaerobic composting process. (10 Marks)
 b. Explain briefly Bangalore process of composting. (10 Marks)
- 6 a. Explain area method and trench method of land filling techniques. (10 Marks)
 b. With neat sketch, explain the methods of controlling gas movement, with vents and barriers. (10 Marks)

10CV757

- 7 a. Explain the formation of leachate in the landfill. (10 Marks)
b. Determine the landfill area required for municipality, with population 50,000. Given that
i) Solid waste Generation = 450 gm/person/day.
ii) Compacted density of landfill = 504 kg/mt³.
iii) Average depth of compacted solid waste = 5. (10 Marks)
- 8 Write short notes on :
a. Transfer station.
b. Vermi composting.
c. Biomedical waste disposal methods.
d. Mechanical volume reduction. (20 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2019
Pavement Materials and Construction

Time: 3 hrs.

Max. Marks: 100

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

PART – A

- 1 a. Explain briefly the Rothfutch's method of aggregate blending techniques with a neat sketch. (10 Marks)
- b. Indicate the suitability of the following tests on the selection of proper aggregates for various bituminous surfacing :
 (i) Aggregate impact test (ii) Los Angles Abrasion test. (10 Marks)
- 2 a. Differentiate between tar and bitumen. (04 Marks)
- b. Explain the manufacturing process of bitumen with a neat sketch. (10 Marks)
- c. Specify the standard values recommended for bitumen to be used in road works for the following tests:
 (i) Penetration test (ii) Ductility test. (06 Marks)
- 3 a. Mention the various adhesion tests conducted on bituminous mixes. Explain immersion trafficking test with neat sketch. (12 Marks)
- b. Explain briefly the preparation of emulsion and types of emulsions. (08 Marks)
- 4 a. Explain briefly the desirable properties of bituminous mixes. (08 Marks)
- b. A asphalt concrete mix for the Marshall stability test gave the following results:
 Coarse aggregate = 40% , Specific gravity = 2.70
 Fine aggregate = 46% , Specific gravity = 2.65
 Mineral filler = 8% , Specific gravity = 3.0
 Bitumen = 6% , Specific gravity = 1.03
 The prepared specimen weigh 1220 gm in air and 706 gm in water. Determine :
 (i) Maximum theoretical bulk density (ii) Air voids in the total mix
 (iii) Voids in mineral aggregate (iv) Voids filled with bitumen (12 Marks)

PART – B

- 5 a. Explain briefly the working principle of power shovel and class shell, with neat sketch. (10 Marks)
- b. Briefly explain the different types of rollers used in road construction. (10 Marks)
- 6 a. Enumerate the steps in the construction of subgrade. What are the quality control tests or checks for subgrade construction? (10 Marks)
- b. Explain the steps in the formation of an embankment (10 Marks)
- 7 a. Differentiate between flexible and rigid pavement. (08 Marks)
- b. Explain the material specification, construction method and quality control checks for wet mix macadam. (12 Marks)
- 8 a. Explain the procedure adopted for the construction of cement concrete roads. (10 Marks)
- b. Explain the various types of joints in cement concrete road and their significance. (10 Marks)

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10CV765

Seventh Semester B.E. Degree Examination, June/July 2019
Air Pollution and Control

Time: 3 hrs.

Max. Marks:100

Note:1. Answer any FIVE full questions, selecting atleast TWO questions from each part.
2. Any missing data may be suitably assumed.

PART – A

- 1 a. Define Air Pollution. Explain sources of Air pollution. (06 Marks)
b. Explain Primary and Secondary Air pollutants, with examples. (08 Marks)
c. Explain Photo chemical smog and coal induced smog. (06 Marks)
- 2 a. What are the harmful effects of polluted air on Human beings? (10 Marks)
b. List the major Air pollution episodes. Explain Bhopal Gas Tragedy. (10 Marks)
- 3 a. Explain the types of Inversions. (08 Marks)
b. Explain with neat sketches the different types of plumes. (12 Marks)
- 4 a. Discuss the factors to be considered for locating an industrial plant with reference to air pollution. (10 Marks)
b. Explain effects and controlling of Noise pollution. (10 Marks)

PART – B

- 5 a. Explain the sampling train, with a neat sketch. (10 Marks)
b. Explain with a neat sketch construction, working and use of a High volume air samples. (10 Marks)
- 6 a. Explain with a neat sketch, the principle and construction of Fabric filter giving its applications. (10 Marks)
b. With a neat sketch, explain the principle and operation of an Electro static precipitator. (10 Marks)
- 7 a. Explain Air pollution due to gasoline and Diesel engines. (10 Marks)
b. Explain causes, effects and remedial measures for acid rain. (10 Marks)
- 8 Write short notes on the following :
 - a. Scrubbers.
 - b. Global warming.
 - c. Ozone layer depletion.
 - d. Air Quality standards. (20 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.