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10CV71

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
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 missing data suitably.

PART – A

- 1 a. Explain the different types of sewerage systems with their merits, demerits and suitability. (08 Marks)
 b. Explain the factors affecting dry weather flow. (06 Marks)
 c. A certain district of a city has a projected population of 50,000 residing over an area of 40 hectares. Find the desired discharge for the sewerline for the following data:
 i) Rate of water supply = 200 lit per capita per day.
 ii) Average impermeability coefficient for the entire area = 0.3
 iii) Time of concentration = 50 minutes.
 A sewerline is to be designed for a flow equivalent to the wet weather flow plus twice the DWF. Use U.S. ministry of health formulae. Assume that 75% of water supply reaches in sewer as wastewater. (06 Marks)
- 2 a. Briefly explain self cleansing velocity and non scouring velocity with their values. (06 Marks)
 b. Explain the desirable characteristics of a sewer material. List the sewer materials commonly used. (08 Marks)
 c. A stoneware sewer 30 cm in diameter is laid at a gradient of 1 in 100 using $N = 0.013$ in Manning's formulae, calculate the velocity, discharge and Chagy's coefficient when the sewer is running full. (06 Marks)
- 3 a. Explain with a neat sketch, working of a deep manhole. (08 Marks)
 b. Write the basic principles of home drainage systems. (06 Marks)
 c. Write a note on sewer ventilation and cleaning of sewers. (06 Marks)
- 4 a. Explain different types of sampling. (06 Marks)
 b. Write a note on nitrogen cycle. (06 Marks)
 c. Define BOD and COD. Determine ultimate BOD for a sewage having 5-day BOD at 20°C as 160 mg/l. Assume deoxygenation content as 0.2 per day. (08 Marks)

PART – B

- 5 a. Briefly explain factors affecting self purification process. (08 Marks)
 b. Explain with a neat sketch, the salient features of oxygen sag curve. (06 Marks)
 c. Write short notes on:
 (i) Sewage sickness (ii) Sewage farming. (06 Marks)
- 6 a. Explain with a flow diagram, a conventional sewage treatment plant. Discuss the function of each component. (08 Marks)
 b. Explain different types of screen. (06 Marks)
 c. Design a primary settling tank of rectangular shape for a town having a population of 50,000 with a watersupply of 180 litres per capita per day. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- 7 a. With the help of a neat sketch, explain the working of trickling filter. (10 Marks)
b. Mention the modification of activated sludge process. Explain any two of them. (10 Marks)
- 8 a. With the help of neat sketch, explain working of sludge drying beds. (10 Marks)
b. Write short notes on:
i) Mechanism of anaerobic sludge digestion.
ii) Oxidation ditches. (10 Marks)

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10CV72

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Design of Steel Structures

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Use of IS800-2007 and steel tables are allowed.

PART – A

- 1 a. What are the advantages and disadvantages of using steel structures? (06 Marks)
- b. Distinguish between working stress design and limit state design of steel structures. (08 Marks)
- c. What are the different loads and load combinations to be considered in the design of steel structures? (06 Marks)
- 2 a. Explain the various modes of failure of bolted connections. (05 Marks)
- b. Design the bolted connection between flange of the column ISHB 350 @ 661.2 N/m and 10mm thick bracket plate. The bracket plate carries a load of 225kN at an eccentricity of 250mm. use M20 bolts of grade 4.6. (15 Marks)
- 3 a. What are the advantages and disadvantages of welded connections? (06 Marks)
- b. Determine the maximum load that can be resisted by the bracket shown in Fig Q3(b) by fillet weld of size 6mm. (14 Marks)

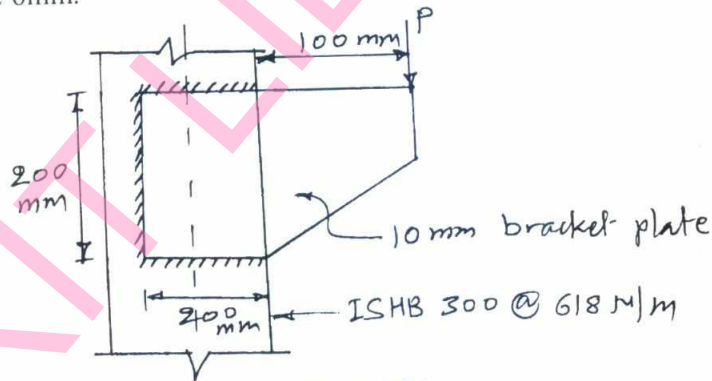


Fig Q 3(b)

- 4 a. State the upper bound, lower bound and uniqueness theorems. (06 Marks)
- b. Analyze the continuous beam ABC subjected to working loads shown in Fig Q4(b) and determine the plastic moment. Adopt a load factor of 1.85. (14 Marks)

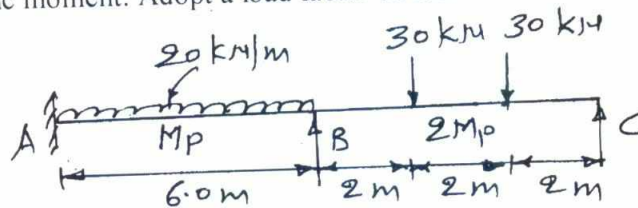


Fig Q4 (b)

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PART – B

- 5 a. A single unequal angle ISA $90 \times 60 \times 6$ is connected to a 10mm gusset plates at the ends with five numbers of 16mm bolts to transfer tension. Determine the design tensile strength of the angle if the gusset plate is connected to 90mm leg. (15 Marks)
- b. What is a lug angle? Explain in brief with a diagram. (05 Marks)
- 6 Design a built up column with two channels back to back to length 8m to carry an axial factored load of 1000 kN. The column is hinged at both ends. Design the column with lacings with bolted connections. (20 Marks)
- 7 a. Explain the types of column bases. (06 Marks)
- b. Design a gusseted base for a column ISHB 350@ 710N/m with two plates 450mm×20mm carrying a factored load of 3600kN. The column is to be supported on concrete pedestal to be built with M20 concrete. (14 Marks)
- 8 Design a steel beam section for supporting roof of a hall for the following data and apply usual checks. Assume Fe415 grade steel clear span = 6.5m, End bearings = 150mm C/C spacing of beams = 3m. Imposed load on beam = 10kN/m^2 Beam depth is restricted to 375mm. The compression flange of the beam is laterally supported throughout. (20 Marks)

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10CV/CT73

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Estimation and Valuation

Time: 3 hrs.

Max. Marks:100

- Note:** 1. *Question No. 1 is compulsory.*
 2. *Answer any FOUR full questions, selecting atleast TWO questions each from Part-B and Part-C.*
 3. *Assume any missing data suitably.*

PART – A

- 1 The plan and cross section of the wall of the proposed “Office Building” is shown in Fig.Q1 work out the quantities and cost of the following items of work. Thickness of wall = 300 mm, Height of ceiling = 3100 mm.
- Earthwork in excavation for foundation @ ₹200/m³
 - Plain cement concrete for foundation at ₹5500/m³
 - Size stone masonry in CM 1:4 for foundation and plinth at ₹ 4500/m³
 - First class brick work in super structure in CM 1:6 @ ₹7000/m³. (40 Marks)

PART – B

- 2 The plan and section of the “Septic Tank” is given in Fig.Q2. Work out the quantities and cost of the following items of the work:
- Earthwork in excavation @ ₹ 250/m³
 - First class brickwork in CM 1:3 @ ₹ 7600/m³ (15 Marks)
- 3 Write a detailed specification for the following items of work:
- Reinforced cement concrete
 - Cement plastering
 - painting to new woodwork. (15 Marks)
- 4
- List the various purpose of estimating. (05 Marks)
 - Explain the following approximate methods of estimating for building:
 (i) Service unit or unit rate method (10 Marks)
 (ii) Bay method
- 5
- Explain “Sinking Fund”. (05 Marks)
 - Briefly explain “The piece work agreement”. (05 Marks)
 - Mention the advantages and disadvantages of “Lump sum contract”. (05 Marks)

PART – C

- 6 Estimate the quantity of earthwork in banking and cutting by mid sectional area method for a portion of road from the following data:

Distance in ‘m’	0	100	200	300	400	500	600	700	800	900	1000	1100	1200
R.L. of ground	114.00	114.60	115.00	115.20	116.10	116.50	118.00	118.25	118.10	117.80	117.75	117.80	119.20
R.L. of formation	115.0	Upward Gradient of 1 in 200 upto 600 m						Downward gradient of 1 in 400					

Formation width of road is 10 metre. Side slope 2:1 in banking and 1.5:1 in cutting. (15 Marks)

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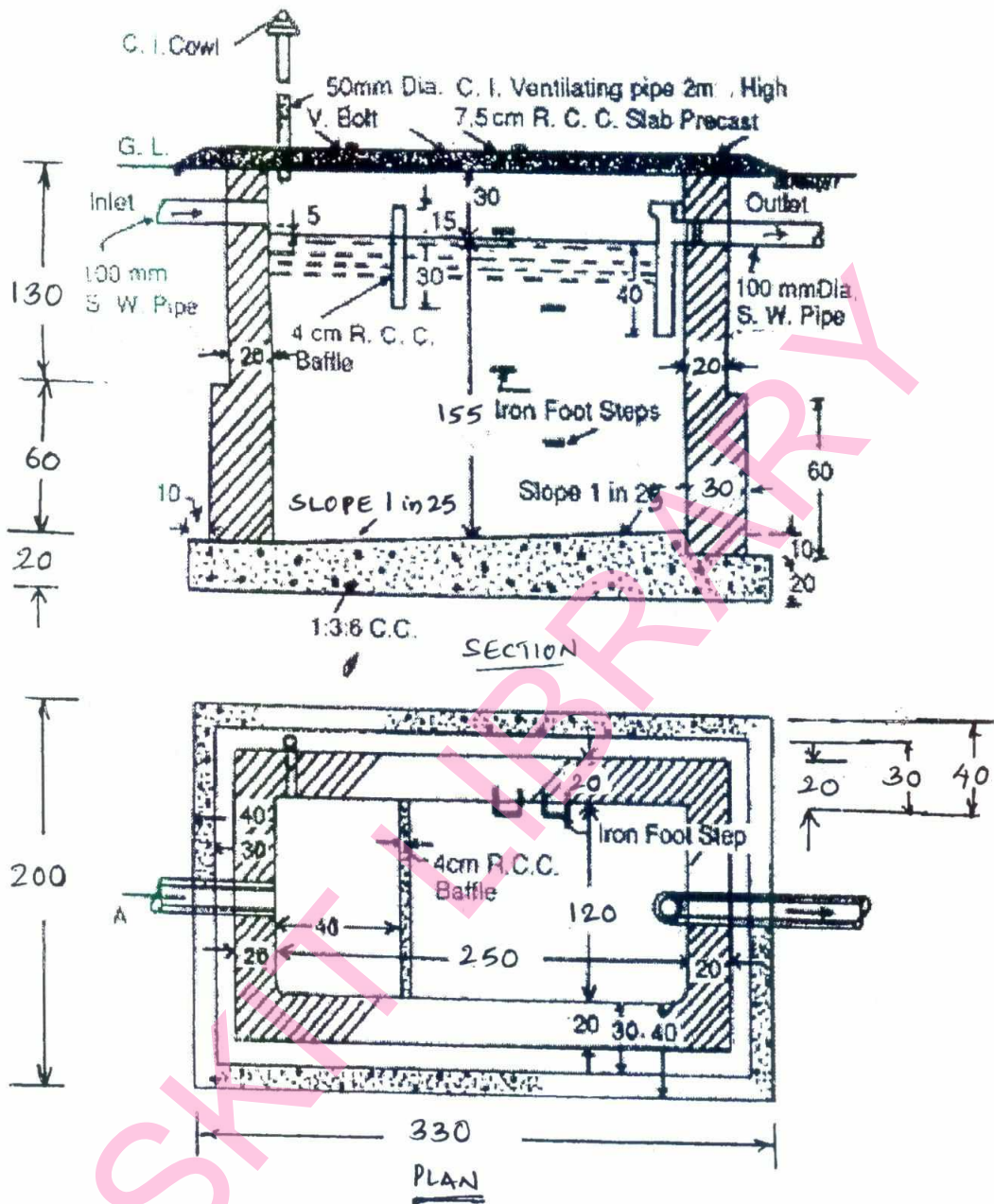


FIG Q2 - SEPTIC TANK

ALL DIMENSIONS IN CENTIMETRE UNLESS OTHERWISE SPECIFIED

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Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Design of Prestressed Concrete Structures

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1
 - a. Define pre-stressed concrete. State its advantages over reinforced concrete. (06 Marks)
 - b. Explain why high strength steel and high strength concrete are used in prestressed concrete. (08 Marks)
 - c. Explain with a neat sketch “Hoyer’s long line” system of pre-tensioning. (06 Marks)

- 2
 - a. What is a pressure line? (02 Marks)
 - b. Explain the concept of load balancing in prestressed concrete design. (06 Marks)
 - c. A concrete beam of symmetrical I-section supports a superimposed load of 3 kN/m over a span of 8 m. It is prestressed by a cable carrying a force of 120 kN at an eccentricity of 150 mm at mid span section. The top and bottom flanges of the I-beam are 250 mm wide and 80 mm deep, thickness of web is 80 mm and overall depth is 450 mm. Determine the resultant stresses at mid span section for the following cases of loading:
 - (i) Prestress + self weight
 - (ii) Prestress + Self weight + Live load.
 Neglect the losses. $\gamma_c = 24 \text{ kN/m}^3$. (12 Marks)

- 3
 - a. List the immediate and time dependent prestress losses in a PSC beam. (04 Marks)
 - b. A pre-stressed concrete beam of size 200mm × 300mm is prestressed with $A_s = 160 \text{ mm}^2$ to an initial prestress of 1000 N/mm² at a constant eccentricity of 50 mm. The beam spans 10 m. Calculate the percentage prestress loss, if the beam is post tensioned considering the wires simultaneously tensioned. $E_s = 210 \text{ kN/mm}^2$, $E_c = 35 \text{ kN/mm}^2$, relaxation of stress in steel is 5% of initial stress, shrinkage of concrete is 200×10^{-6} , slip and deformation of anchorage is 0.5 mm per anchorage, creep coefficient is 2.0, Wobble coefficient = 0.0015/m. (16 Marks)

- 4
 - a. List the factors influencing deflections of a prestressed concrete beam. (04 Marks)
 - b. Using Mohr’s theorem, obtain an expression for computing deflection at mid span in a PSC beam with straight tendons with constant eccentricity ‘e’. (04 Marks)
 - c. A concrete beam with a cross sectional area of $32 \times 10^3 \text{ mm}^2$ and radius of gyration of 72 mm is prestressed by a parabolic cable carrying an effective stress of 1000 N/mm². The span of the beam is 3 m. The cable composed of 6 wires of 7 mm diameter has an eccentricity of 50 mm at the centre and zero at the supports. Neglecting all losses, find the central deflection of the beam for the following cases. Assume : $E_c = 38 \text{ kN/mm}^2$, $D_c = 24 \text{ kN/m}^3$.
 - (i) Self weight + pre stress
 - (ii) Self weight + prestress + live load of 2 kN/m. (12 Marks)

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PART – B

- 5 a. List the different types of flexural failures in a PSC beam. Explain failure of under reinforced sections. (06 Marks)
- b. Compute the flexural strength of a pretensioned T-section having flange width = 1200 mm, flange thickness = 150 mm, rib width = 300 mm, rib depth = 1500 mm. The high tensile steel having an area of 4700 mm^2 is located at an effective depth of 1600 mm. Take: $f_{ck} = 40 \text{ MPa}$ and $f_p = 1600 \text{ MPa}$. (14 Marks)
- 6 a. Discuss briefly the modes of failure due to shear. (05 Marks)
- b. A simply supported beam $120 \text{ mm} \times 300 \text{ mm}$ in section having a span of 7 m is prestressed with a parabolic cable which has maximum eccentricity of 100 mm at midspan and minimum eccentricity of 20 mm at support, both below CGC of concrete. Effective prestress in the cable is 300 kN. The beam carries a udl of 30 kN/m exclusive of self weight. Determine the principal tension at 0.6 m from the left support and 20 mm above the centroidal axis. Take density of concrete as 25 kN/m^3 . (15 Marks)
- 7 a. What is transmission length? List the factors affecting transmission length. (04 Marks)
- b. The end block of a PSC girder is $200 \text{ mm} \times 300 \text{ mm}$. The beam is post tensioned by the anchorages each of 100 mm diameter with their centers located at 75 mm from the top and bottom of the beam. The force transmitted by each anchorage is 2000 kN. Calculate the bursting force and design suitable reinforcement as per IS provisions. Also sketch the arrangement of anchorage zone reinforcement. Use 10 mm diameter links and yield stress of steel is 260 N/mm^2 . (16 Marks)
- 8 Design a pretensioned symmetrical I-beam for an effective span of 7 m to support a superimposed load of 6 kN/m. Dead load factor is 1.5 and live load factor is 2.5. Permissible stresses are:
 At transfer, Compressive stress = 14 N/mm^2
 Tensile stress = 1.4 N/mm^2
 At working load, Compressive stress = 16 N/mm^2
 Tensile stress = 1.4 N/mm^2
 7 mm high tensile steel wires having an ultimate tensile strength of 1600 N/mm^2 are available for use. Take $E_c = 34 \text{ kN/mm}^2$, loss ratio = 0.75, $f_{ck} = 50 \text{ N/mm}^2$, tensile strength of concrete is 1.7 N/mm^2 . (20 Marks)

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10CV755

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Highway Geometric Design

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 suitably.

PART – A

- 1 a. List and discuss the various design control elements for roads. State the IRC values wherever applicable. (10 Marks)
- b. List the factors affecting friction or skid resistance of a pavement surface. (10 Marks)
- 2 a. Draw the typical cross section of NH and SH passing through areas in banks cutting. (10 Marks)
- b. Explain factors affecting sight distance on a road and also explain PIEV theory briefly. (10 Marks)
- 3 a. Find out OSD required for a design speed of 80 kmph for a 2 lane and 2 way traffic road. Assume $a = 1.6$ kmph/sec. Calculate and draw sketch showing overtaking zone. (10 Marks)
- b. Explain with a neat sketch sight distance criteria at an uncontrolled intersection. (10 Marks)
- 4 a. Derive an equation for finding the super elevation for a curve of radius 'R' having a design speed of V kmph, if the design coefficient of lateral friction is 'f'. Also mention the minimum value of super elevation to be provided. (10 Marks)
- b. Calculate the length of transition curve for a design speed of 80 kmph at a horizontal curve of radius 250m. Assume pavement rotated about inner edge. (10 Marks)

PART – B

- 5 a. Define the different types of gradient and also state their IRC values. (10 Marks)
- b. Design a valley curve formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of valley curve to fulfill, both comfort condition and head light sight distance requirements for a design speed of 80 kmph. The rate of change of centrifugal acceleration is $C = 2.6\text{m/sec}^3$. (10 Marks)
- 6 a. With neat sketches explain unchannelized and channelized intersection. What are the advantages and limitations of such intersections? (10 Marks)
- b. List the design steps involved in designing a rotary intersection. (10 Marks)
- 7 a. List the importance of a highway drainage system. (10 Marks)
- b. Bring out the design steps involved in filter material of a sub-surface drainage. (10 Marks)
- 8 Write short notes on any four:
 - a. Types of interchange.
 - b. Design standards for hilly road.
 - c. Design of road humps as per least IRC provisions.
 - d. Passenger car unit.
 - e. Right of way.
 - f. Gap in median. (20 Marks)

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10CV757

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. With a neat schematic diagram, explain the functional elements of the solid waste management. (10 Marks)
b. Explain the classification and sources of solid wastes. (10 Marks)
- 2 a. Distinguish between hauled container system and stationary container system with a schematic diagram. (10 Marks)
b. With neat sketches explain different types of transfer stations. (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) Hand sorting
(iii) Air separation (10 Marks)
- 4 a. What is incineration? With the help of neat sketch, explain incineration process. (08 Marks)
b. Explain 3Ts of incineration process. (06 Marks)
c. Define pyrolysis. Explain the process in brief. (06 Marks)

PART – B

- 5 a. Explain the following composting methods:
(i) Bangalore method
(ii) Indore method. (10 Marks)
b. What are the factors to be considered for the design of aerobic composting process? (10 Marks)
- 6 a. Explain the various factors considered in the selection of a site for a sanitary landfill. (08 Marks)
b. Explain area method and trench method of land filling techniques. (08 Marks)
c. What is a leachate? What are its effects on ground water? (04 Marks)
- 7 a. Explain briefly the various methods of solid waste disposal. (12 Marks)
b. Explain the biomedical waste disposal methods. (08 Marks)
- 8 Write short notes on the following :
a. Reuse and recycling of plastic waste
b. Garbage chutes
c. Hazardous waste
d. Vermi composting (20 Marks)

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10CV763

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. Give a brief write up on importance of derivable properties of road aggregates. Describe the laboratory procedure for determination of toughness property of road aggregates. (10 Marks)
- b. Explain the Rothfusch method of desired gradation. (10 Marks)
- 2 a. Bring out the major differences between bitumen and Tar. Describe the laboratory procedure for determination of hardness property of bitumen. (10 Marks)
- b. Describe the chemical constitution of bitumen and list the desirable requirements of bitumen. (10 Marks)
- 3 a. Compare the salient characteristics of cutback and emulsions and describe under what circumstance each one is used. (10 Marks)
- b. What is stripping of bitumen? What are its adverse effects? How is the extent of bitumen stripping estimated in the lab? (10 Marks)
- 4 a. Explain the steps in bituminous mix design. (10 Marks)
- b. A BC mix is prepared with aggregates A, B and C in the proportion A : B : C = 40 : 50 : 10. The respective specific gravity of A, B and C and bitumen are 2.7, 2.8, 3.0 and 1.02. The bitumen content by weight of aggregate is 5%. Determine the maximum theoretical density, percentage air voids, voids in mineral aggregates, voids filled with bitumen given that the specimen weighs 1251.5 g in air and 720.6 g in water. (10 Marks)

PART – B

- 5 a. What is a clamshell? With a neat sketch explain its operation and applications. (10 Marks)
- b. Write an explanatory note on Rollers in road construction. (10 Marks)
- 6 a. Describe the construction method and quality control tests in subgrade. (10 Marks)
- b. Explain the circumstances in which construction of embankment becomes necessary. (10 Marks)
- 7 a. Describe the suitability of following in bituminous pavement construction:
 - i) Surface dressing
 - ii) Penetration macadam
 - iii) Bituminous premixed carpet
 - iv) Builtup spray grout
 (10 Marks)
- b. Explain the material specification and construction steps in Built-up spray grout. (10 Marks)
- 8 a. Briefly describe the quality control tests used in construction of concrete pavements. (10 Marks)
- b. Write a note on various types of joints in concrete pavement indicating their purpose of providing. (10 Marks)

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10CV765

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Air Pollution and Control

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Draw neat sketches wherever required.

PART – A

- 1 a. Explain the classification and properties of Air pollution. (12 Marks)
b. Distinguish between Photo – Chemical Smog and Coal Induced Smog. (08 Marks)
- 2 a. Discuss the prime factors and various effects of Air pollution on human health. (10 Marks)
b. List the Air pollutants affecting plants. (05 Marks)
c. Explain the effects of Air pollution on materials. (05 Marks)
- 3 a. What are the meteorological parameters that influence Air pollution? (08 Marks)
b. Explain briefly the Gaussian Dispersion Model. (06 Marks)
c. Briefly explain the Wind – Rose diagram. (06 Marks)
- 4 a. What are the factors to be considered for Industrial plant location based on Environmental considerations? (10 Marks)
b. Define Noise Pollution. Explain the sources and different methods of Noise pollution control. (10 Marks)

PART – B

- 5 a. Explain the classification of Sampling methods, Preliminary considerations and stages of sampling. (12 Marks)
b. Briefly explain the control of gaseous emissions. (08 Marks)
- 6 a. List the methods to classify the emission from Gasoline powered vehicles. Explain in brief. (10 Marks)
b. Describe the control exhaust emissions in vehicles. (10 Marks)
- 7 a. Define Acid Rain. How it is caused? Explain control method. (10 Marks)
b. What is meant by Global Warming? Explain the effects of Global Warming on Environment. (10 Marks)
- 8 a. Enumerate the Environment (protection) Act 1986. (05 Marks)
b. Mention any five drinking water standards. (05 Marks)
c. List the Indian Air quality standards. (05 Marks)
d. List the Noise Pollution standards. (05 Marks)

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