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10CV71

Seventh Semester B.E. Degree Examination, June/July 2018
Environmental Engineering – II

Time: 3 hrs.

Max. Marks:100

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

PART – A

1 a. What is conservancy system (dry system) of sanitation? Give any two merits and demerits of this system. **(06 Marks)**
   b. Define sewerage and explain combined sewerage system with its merits and demerits. **(08 Marks)**
   c. Explain:
      i) time of entry
      ii) time of flow
      iii) time of concentration **(06 Marks)**

2 a. What is dry weather flow (DWF)? What are its sources and give any two factors affecting DWF? **(06 Marks)**
   b. Using rational method, determine the discharge for a storm water drain. Area of catchment 100 hactares. Intensity of rainfall 50 mm/hr. Details of catchment area is as follows.

Type of Area	Percentage Area	Impermeability Coefficient
Roofs	15	0.9
Pavements	20	0.8
Lawns and gardens	40	0.15
Unpaved	15	0.20
Wooded	10	0.05

   (06 Marks)
   c. What are sewer appurtenances? List any four of them and explain with a neat sketch the catch basin. **(08 Marks)**

3 a. Explain the test for straightness and obstructions in sewers. **(04 Marks)**
   b. Calculate the diameter and discharge of a circular sewer laid at a slope of 1 in 400 when it is running half full and with a velocity of 1.9 m/sec. Take 'n' in Manning's Formula as 0.012. **(08 Marks)**
   c. Explain self cleansing and non scouring velocities in sewers. Give any two factors on which it depends. **(08 Marks)**

4 a. What is a sewer? What are the requirements of good sewer materials? List any four sewer materials commonly used. **(08 Marks)**
   b. Distinguish between BOD and COD and explain their role in wastewater treatment. **(06 Marks)**
   c. What is a trap? Give its classifications. **(06 Marks)**

1 of 2

PART – B

5 a. Explain:
      i) Sludge drying beds
      ii) Disposal of screenings. **(06 Marks)**
   b. What is meant by modifications of ASP and list any four modifications. Explain any one briefly. **(06 Marks)**
   c. Calculate the dimensions of an oxidation pond for treating sewage from a residential colony with a population of 8000 persons. Assume the rate of sewage flow as 200 lpcd and 5 day BOD of sewage as 250 mg/L. Take organic loading as 300 kg/ha/day and L = 4B and depth of pond as 1.2 m. Apply check for detention time and comment on the design. **(08 Marks)**

6 a. List any six conditions favourable for land disposal of sewage. **(06 Marks)**
   b. Explain the different zones of purification in dilution method of sewage disposal and oxygen sag curve. **(10 Marks)**
   c. Give the significance of skimming tank and grit chamber in sewage treatment plant. **(04 Marks)**

7 a. Discuss with one example each for reuse and recycle of waste-water. **(04 Marks)**
   b. Explain the working principle of trickling filter and activated sludge process treatment of sewage. **(06 Marks)**
   c. Explain with a neat sketch the septic tank. **(05 Marks)**
   d. Give any three objectives of sludge digestion. **(05 Marks)**

8 a. A rectangular sedimentation tank is used to treat 2 MLD of sewage. For a design period of 2.5 hours, velocity of flow of 0.2 m/minute and effective depth of 3m, determine:
      i)   The length of tank required
      ii) Width of tank and
      iii) Over flow rate of tank in m^3/m^2/day **(08 Marks)**
   b. Explain F/M ratio and sludge volume index (SVI) with significance in ASP. **(06 Marks)**
   c. Give the working principle and any two advantages and disadvantages of oxidation ponds. **(06 Marks)**

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Seventh Semester B.E. Degree Examination, June/July 2018
Design of Steel Structures

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. What are the advantages and disadvantages of steel structures?   **(08 Marks)**
   b. Mention different types of loads and load combination.   **(04 Marks)**
   c. Explain design consideration of steel structures.   **(08 Marks)**

2 a. Explain with neat sketch on modes of failures in bolted joint.   **(06 Marks)**
   b. Determine the strength and efficiency of lap joint consist of 10 mm and 8 mm thick plates.
      Use M18 grade 5.6 black bolt and Fe440 grade plate. Edge distance = 40 mm,
      Pitch = 50 mm of Fig. Q2 (b). Assume fully threaded bolt.   **(14 Marks)**
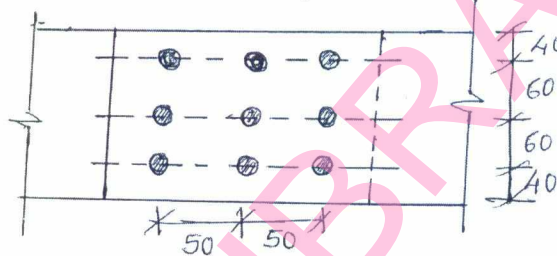

Fig. Q2 (b)

3 a. What are the advantages and disadvantages of welding?   **(06 Marks)**
   b. Determine the Bracket load 'P' the column can carry as shown in Fig. Q3 (b). Take size of
      weld as 8 mm, $f_u = 410$ N/mm^2.   **(14 Marks)**

All dimensions are in mm

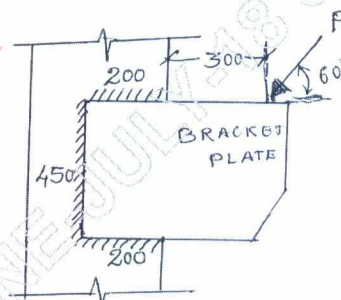Fig. Q3 (b)

4 a. Calculate the shape factor of a T section having a flange of 200 mm and 20 mm thickness,
      web of 180 mm depth and 10 mm thickness.   **(08 Marks)**
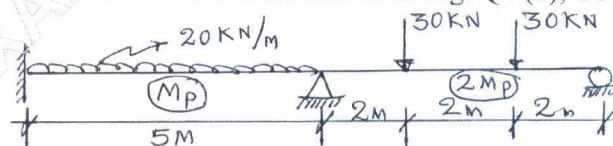   b. Calculate plastic moment for the beam shown in Fig. Q4 (b), Use load factor 2. **(12 Marks)**

Fig. Q4 (b)

PART – B

5 a. Explain the different modes of failure of tension members. **(06 Marks)**

b. Determine the strength of the plate $160mm \times 10mm$ thick, connected with bolts subjected to a force as shown in Fig. Q5 (b). Use M18 dia bolts, take $f_y = 250$ N/mm^2, $f_u = 410$ N/mm^2. **(14 Marks)**
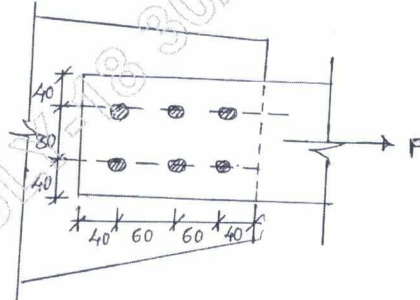

Fig. Q5 (b)

6 a. Design a compression member using double channel section to carry a load of 1500 KN, the height of column is 6 m and both ends are fixed, channels are arranged back to back. Assume $f_{cd} = 150$ N/mm^2. **(10 Marks)**

b. Design a compression member using four angle sections arranged in a box shape of size $400mm \times 400mm$ to carry a load of 2500 kN. The height of the column is 5 M with one end fixed and other end hinged. Assume $f_{cd} = 180 N/mm^2$. **(10 Marks)**

7 a. Mention type of column base. Explain the terms with a neat sketch. **(06 Marks)**

b. Design a column base (slab base) and concrete base for a column ISHB400 subjected to an axial load of 1000 KN. Use M20 grade concrete, safe bearing capacity of soil is 200 KN/m^2. Draw neat sketch with bolted connection (M22 grade 9.8 HSFG Bolt). **(14 Marks)**

8 The RCC floor of a class room $6m \times 12m$ is supported on beam kept @ 3 m C/C. The beams are simply supported at ends over a span of 6 m, and rest on 300 mm thick masonry walls. Assuming the thickness of slab = 125 mm, Live Load on slab = 4 KN/m^2. Design an interior beam using IS specification. Apply all the necessary checks. **(20 Marks)**

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Seventh Semester B.E. Degree Examination, June/July 2018
Estimation and Valuation

Time: 3 hrs. Max. Marks:100

Note: 1. *PART-A is compulsory.*
2. *Answer any two full questions from PART-B and PART-C each.*
3. *Missing data may be assumed suitably.*

PART – A

1 The details of residential building is as shown in Fig.Q1. Work out the quantities and cost for the following items of work, by the centre line method.
   i)   Centre line calculation with line diagram. **(06 Marks)**
   ii) Earth work excavation for foundation in ordinary soil at Rs.180/m³. **(05 Marks)**
   iii) Size stone masonry in CM 1:8 for foundation and basement at Rs.3800/m³. **(09 Marks)**
   iv) First class brick work in super structure in CM 1:6 upto roof slab at Rs.4300/m³. **(09 Marks)**
   v)   Plastering to inside walls in CM 1:3 with lime rendering at Rs.220/m². **(06 Marks)**
   vi) Total cost abstract for above items. **(05 Marks)**

PART – B

2 Estimate the detailed quantity of a fully paneled teak wooden door of size 1.2m × 2.10m as shown in Fig.Q2. Also work out the cost of a Honne wood and fastening and fixture required. Use your local prevailing rates. The data given are as under:
   Frame = 8 × 12 cms
   Top rails = 10 × 4.5 cms
   Lock rail = 15 × 4.5 cms
   Frieze rail = 10 × 4.5 cms
   Hanging styles = 10 × 4.5 cms
   Bottom rail = 20 × 4.5 cms. **(15 Marks)**

3 The details of a manhole is given is Fig.Q3. Find the quantities of the following items.
   i)   Earthwork in excavation for foundation in hard soil.
   ii) B.B.M in CM 1:4 for walls
   iii) R.C.C. roof covering slab in CC 1:2:4.
   iv) Plastering in CM 1:3 for inside walls. **(15 Marks)**

4 Write the detailed specification for any three of the following items:
   i)   Burnt brick masonry in CM 1:6
   ii) R.C.C. work in roof slab in CC 1:2:4
   iii) Plastering in CM 1:3 for inside walls
   iv) Mangalore tiled roof over sal wood battens. **(15 Marks)**

PART – C

5 Work out from first principles the analysis of rate for the following any three items:
   i)   Current concrete foundation bed in CC 1:3:6
   ii) Coursed rubble stone masonry in CM 1:8 for foundation.
   iii) Damp proof course 25 mm thick in CM 1:3
   iv) 12 mm thick Cement plastering in CM 1:3. **(15 Marks)**

6   Estimate the quantities of earth work from chainage 70 to 76 measured with a standard 20 m chain from the following data. Use mean sectional area method. Side slopes 1:1 in cutting and 2:1 in banking.

Chainage	70	71	72	73	74	75	76
Ground RL's	88.10	87.74	87.80	88.20 90.40	90.75	90.20	89.98
Formation level	88.50	← raising gradient 1 in 100					

Formation width of road is 10 m. Draw the longitudinal section of the proposed road.

(15 Marks)

7   Write short notes on:
   i)   Earnest money and security deposit
   ii)   Measurement book and nominal muster roll
   iii) Administrative approval and technical sanction
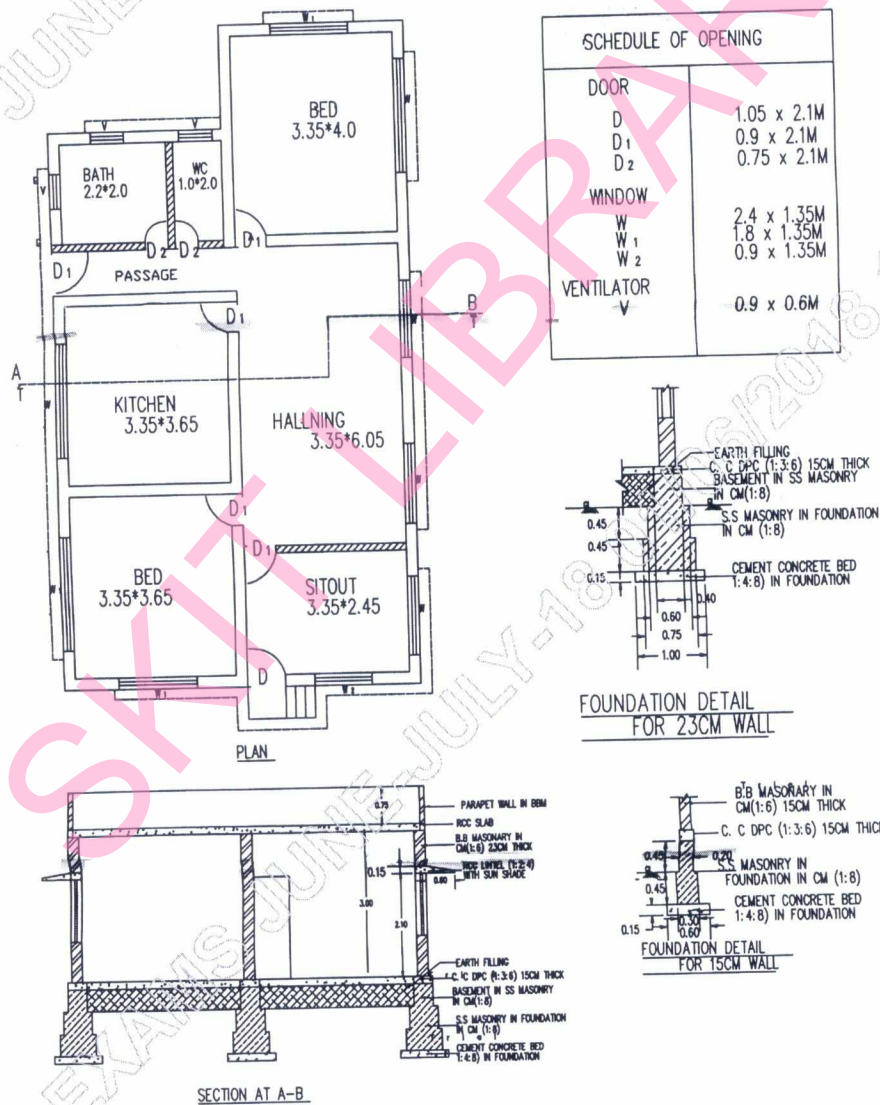
(15 Marks)

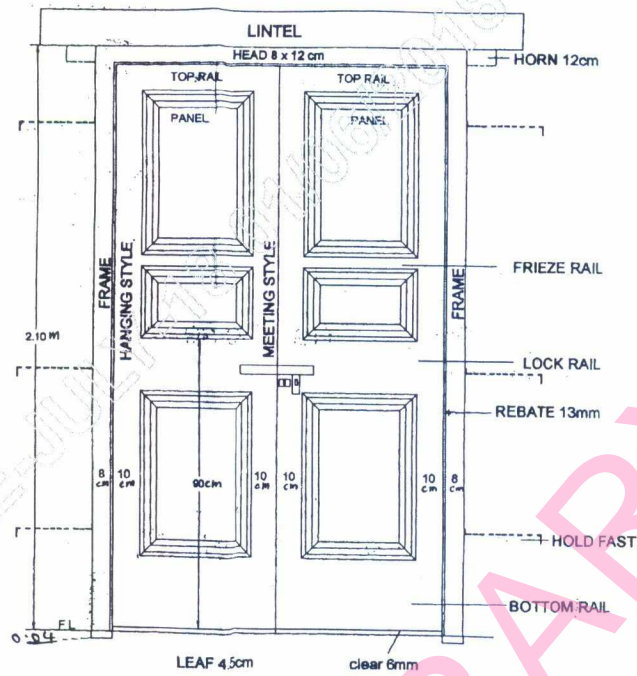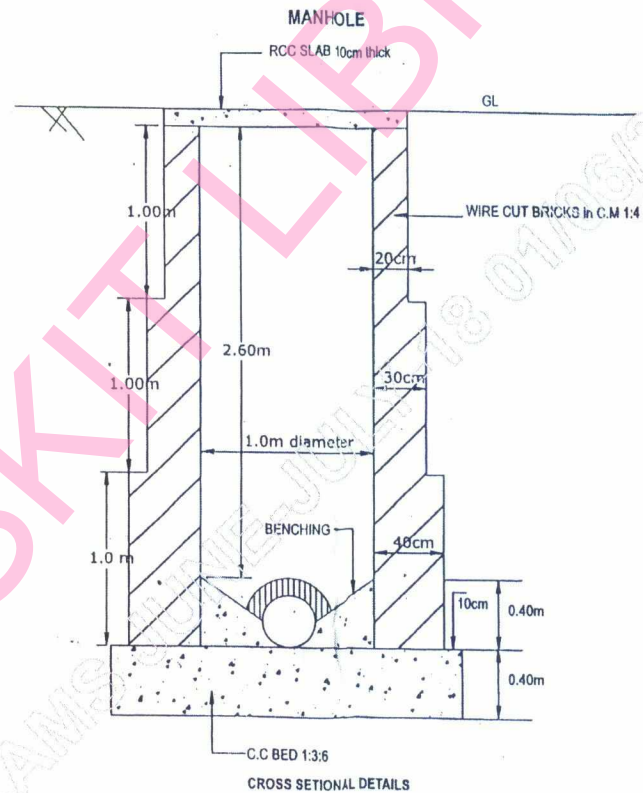

Fig.Q1

Fig.Q2

CROSS SETIONAL DETAILS

Fig.Q3

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Seventh Semester B.E. Degree Examination, June/July 2018
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 IS1343 code is permitted.

<u>PART – A</u>

1   a.   What is the necessity of using high strength concrete in P.S.C. work?   **(06 Marks)**
    b.   What is the necessity of using high strength steel in P.S.C. construction?   **(04 Marks)**
    c.   List the advantages and disadvantages of prestressed concrete over reinforced cement concrete.   **(10 Marks)**

2   A prestressed concrete T-beam is to be designed to support a superimposed load of 4.4 kN/m over a span of 5 m. The 'T' beam is made up of a flange 400 mm   40 mm thick. The rib is 100 mm wide and 200 mm deep. The stress in concrete must not exceed 15 N/mm^2 at the bottom fibre and zero at the top fibre, due to self weight and prestressing force. Evaluate the prestressing force and it's eccentricity. Evaluate the resulting stresses after L.L is applied. Assume the density of concrete is 24 kN/m^3 and the loss of prestress at 20%.   **(20 Marks)**

3   a.   List the various losses of prestress in tensioned steel.   **(03 Marks)**
    b.   A post tensioned concrete beam 100 mm wide and 300 mm deep, spanning over 10 m is stresses by   **(17 Marks)**

4   a.   Discuss the various factors affecting deflections in P.S.C. beams.   **(06 Marks)**
    b.   The beam of uniform section is prestressed with a bent cable as shown below Fig.Q4(b), in which the initial prestress is 300 kN. Taking the loss ratio as 80%. Determine
         (i) Maximum deflection at transfer of prestress
         (ii) Maximum deflection at working load 8 kN/m. Assume M$_{40}$ concrete.   **(14 Marks)**

Fig.Q4(b)

<u>PART – B</u>
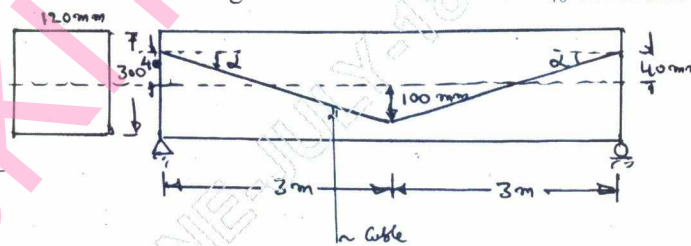
5   a.   What are the different types of failure observed in a prestressed concrete beam? Explain with sketches.   **(08 Marks)**
    b.   A post tensioned bridge girder with unbounded tendons is of base section of overall dimensions 1200 mm wide by 1800 mm deep with wall thickness of 150 mm. The high tensile steel has an area of 4000 mm^2 and its located at an effective depth of 1600 mm. The effective prestress in steel after losses is 1000 N/mm^2, and the effective span of the girder is 24 m. If f$_{ck}$ = 40 N/mm^2 and f$_p$ = 1600 N/mm^2. Estimate the ultimate flexural strength of the section.   **(12 Marks)**

6 a. Discuss briefly the modes of failure due to shear. **(04 Marks)**
    b. List the methods of improving resistance in P.S.C beams. **(02 Marks)**
    c. A simply supported beam of span 6 m is 120×300 mm in section. It is prestressed with a parabolic cable which carries an effective prestress of 200 kN. The cable has a maximum eccentricity of 100 mm at mid span section and minimum eccentricity of 50 mm at the support section. Determine the principal tension at 20 mm above the centroidal fibre in a section which lies at 0.6 m from the left support. The beam carries an all inclusive load of 15 kN/m. **(14 Marks)**

7 a. Explain the stress distribution in end block of a post tensioned prestressed concrete member with neat sketch. **(06 Marks)**
    b. The end block of a prestressed concrete girder is 200 mm wide by 300 deep. The beam is post tensioned by two Freyssinet anchorages each of 100 mm diameter with their centres located at 75 mm from the top and bottom of the beam. The force transmitted by each anchorage being 2000 kN. Compute the bursting force and design suitable reinforcements according to Indian standard IS1343 code provisions. Sketch the arrangement of anchorage zone reinforcement. **(14 Marks)**

8 A post tensioned prestressed concrete beam of rectangular section 300 mm wide is to be designed to resist a live load moment of 360 kN-m on a span of 12m. Assuming 10% less and limiting tensile and compressive stress to 1.5 N/mm^2 and 18 N/mm^2 respectively. Calculate the minimum possible depth and the prestressing force and corresponding eccentricity. Take density of concrete as 24 kN/m^3. **(20 Marks)**

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10CV755

Seventh Semester B.E. Degree Examination, June/July 2018
Highway Geometric Design

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.*

PART – A

1 a. Explain the role of pavement surface characteristics in highway geometric design. What are the factors affecting friction. **(10 Marks)**
   b. Calculate the minimum SD required to avoid a head on collision of two cars approaching from opposite directions of 90 kmpH and 60 kmpH coefficient of friction of 0.7 and a brake efficiency of 50 percent in either case. Assume any missing data suitably. **(10 Marks)**

2 a. What is PIEV theory? Explain briefly. **(08 Marks)**
   b. Calculate the safe over taking sight distance for a design speed of 96 kmpH. Assume all other data suitably and draw a neat sketch of overtaking zone and show the positions of the sign posts. **(12 Marks)**

3 a. Derive an equation for finding super elevation. **(10 Marks)**
   b. 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. Assume missing data suitably as per IRC. **(10 Marks)**

4 a. Explain off-tracking. **(05 Marks)**
   b. What are the objects of providing transition curves? **(05 Marks)**
   c. A national Highway passing through rolling terrain in heavy rain fall area has a horizontal curve of radius 500 m. Design the length of Transition curve. Assuming suitable data as per IRC. **(10 Marks)**

PART – B

5 a. Explain curve resistance and compensation in gradient on horizontal curves. **(10 Marks)**
   b. A valley curve is formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of the valley to fulfill both comfort condition and head light sight distance requirement for a design speed of 80 kmpH. Assume allowable rate of change of centrifugal acceleration $C = 0.6$ m/sec^3. **(10 Marks)**

6 a. What are the objective of channelization? What are the features of channelizing islands? **(10 Marks)**
   b. What are disadvantages and limitation of unchannelized and channelized intersections? **(10 Marks)**

7 a. What is rotary intersection? List the advantages and disadvantages of a rotary intersection. **(10 Marks)**
   b. What are guidelines for selecting a rotary type of intersections? **(10 Marks)**

8 a. What are requirements of a good drainage system? Indicate how the filter material is designed for use in sub-surface drainage system. **(10 Marks)**
   b. Explain with neat sketches, how the subsurface drainage is provided to lower the water table and control seepage flow. **(10 Marks)**

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Seventh Semester B.E. Degree Examination, June/July 2018
Pavement Material & Construction

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   Explain the desirable properties of aggregates to be used in different types of pavement construction. State the tests conducted for each property.   **(08 Marks)**
    b.   Explain the following tests on aggregates and state the permissible limits as per MORTH guidelines for flexible pavements :
         (i)   Crushing test.
         (ii) Impact test.   **(12 Marks)**

2   a.   Compare bitumen and tar. What are the requirements of bitumen used for road works?
                                                                                            (10 Marks)
    b.   Explain with neat sketch manufacturing process of bitumen.   **(10 Marks)**

3   a.   Compare the salient features / characteristics of outback and emulsions. Under what condition each one is used.   **(10 Marks)**
    b.   What is stripping? What are its adverse effects? Explain any one test on bitumen adhesion.
                                                                                            (10 Marks)

4   a.   Explain proportioning of aggregates by Rothfutch's method.   **(08 Marks)**
    b.   Explain the step by step procedure of Marshall method of mix design.   **(12 Marks)**

PART – B

5   a.   What is a power Shovel? With a neat sketch, explain its operation and applications.
                                                                                            (10 Marks)
    b.   What are the different types of compacting equipments used for pavement construction? Write an explanatory note on rollers in road construction.   **(10 Marks)**

6   a.   What are the desirable properties of subgrade soil? Enumerate the steps in preparation of subgrade. How do you evaluate adequacy of compaction.   **(12 Marks)**
    b.   Explain the circumstances in which construction of embankment becomes necessary.
                                                                                            (08 Marks)

7   a.   Explain the material specification and construction steps for Bituminous surface dressing.
                                                                                            (10 Marks)
    b.   Explain the objectives, type of material and method of application for (i) Prime coat (ii) Tack coat.   **(10 Marks)**

8   a.   Explain with a neat sketch, different joints in rigid pavement.   **(10 Marks)**
    b.   Enumerate the steps involved in the construction of cement concrete pavements.   **(10 Marks)**

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Seventh Semester B.E. Degree Examination, June/July 2018
Air Pollution and Control

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting*
at least TWO questions from each part.
2. *Substantiate answers with sketches wherever necessary*

PART – A

1 a. Define 'Air pollution' and tabulate the major and minor constituents of dry clean atmospheric air. **(05 Marks)**
   b. Explain the basic theory of formation of photo chemical smog with necessary reactions and examples, what are the factors affecting the photo chemical reactions. **(10 Marks)**
   c. What is Air Pollution (emission) inventory why it is necessary? **(05 Marks)**

2 a. Write the units used for measurement of air pollutants. **(02 Marks)**
   b. Write an explanatory note on any one Indian air pollution episode. **(06 Marks)**
   c. With a sketch, discuss the structure of the atmosphere **(06 Marks)**
   d. Explain the terms : i) Aerosols ii) Smoke iii) Mist iv) Fermes **(06 Marks)**

3 a. What is Inversion? Discuss briefly the different types of inversion. **(08 Marks)**
   b. With neat sketch, explain the various types of plume behavior. **(08 Marks)**
   c. Write Explanatory note on Fixed Box models and Infinite line source models. **(04 Marks)**

4 a. Describe briefly various equations used in predicting noise levels. **(06 Marks)**
   b. Define noise pollution. Explain sources and control measures of noise pollution. **(08 Marks)**
   c. What are the factors to be considered for industrial plant location based on environmental considerations? **(6 Marks)**

PART – B

5 a. What is meant by "Sampling train"? With neat sketches, explain the isokinetic stack sampling for particulates. **(08 Marks)**
   b. Discuss the various methods of atmospheric sampling. **(08 Marks)**
   c. Explain the adsorption process to control gaseous emissions. **(04 Marks)**

6 a. What are the methods used for the control of gaseous pollutants? Explain any two in detail. **(10 Marks)**
   b. List the various methods of odor control, explain any two in detail. **(10 Marks)**

7 a. What is indoor air pollution? What are the precautionary measures to be taken to overcome this? **(10 Marks)**
   b. Write an explanatory note on :
      i) Ambient Air quality standards
      ii) Global warming and control measures. **(10 Marks)**

8 a. Discuss on the salient features of environment (protection) Act, 1986. **(10 Marks)**
   b. What is meant by acid rain? How is it caused? Discuss on the effects of the same on surface water. **(10 Marks)**

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