Roll No. .....

3204

B. Tech. 5th Semester (Civil Engg.) Examination – December, 2022

WATER SUPPLY & TREATMENT

Paper : PCC-CE-307-G

Time : Three hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. Attempt *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Define per capita demand.

(b) List out the standards for water quality.

(c) List out advantages of rapid sand filter.

(d) Mention the advantages of chlorine, as disinfectant.

(e) What are Flocculators ?

(f) Name the types of intake according to their position.

(g) Write any *two* appurtenances in water conveyance system.

(h) Where the ring system of water distribution system is adopted ?

(i) Write the methods of distribution of water.

(j) What is a standpipe ? $1.5 \times 10 = 15$

SECTION – I

2. Explain briefly : $5 \times 3 = 15$

(a) Different types of water demand.

(b) Factors affecting per capita demand of water.

(c) Factors affecting design period.

3. List different methods of populations forecasting. Explain briefly any *two* methods. 15

SECTION – II

4. What are the objectives of water treatment ? Draw a flow chart of conventional water treatment plant and indicate various units. 15

5. (a) It is required to supply water to a population of 30000 at per capita demand of 150 liters/day. The

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3201

B. Tech. 5th Semester (Civil Engg.) Examination – December, 2022

HYDROLOGY AND WATER RESOURCE ENGINEERING

Paper : PCC-CE-301-G

Time : Three Hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Section. Question No. 1 is ***compulsory***. All questions carry equal marks.

1. Write short notes on the following : $2.5 \times 6 = 15$

(a) Forms of Precipitation

(b) Hydrograph

(c) Non-recording gauges

(d) Effect of urbanization on run-off hydrograph

(e) Classification of run-off

(f) Uses of Current meter

SECTION – A

2. (a) What is the hydrological cycle ? Give a brief description of different components of a hydrologic cycle. 8

(b) Explain briefly intensity duration frequency relationship. 7

3. A watershed has five non recording rain gauges, installed in its area. The amount of rainfall recorded for one of the years is given below : 15

Station	A	B	C	D	E
Rain Fall (cm.)	100	120	190	95	125

Find the required optimum number of non-recording and recording raingauges for this watershed. Assume an error of 10% in the estimation of the mean rainfall.

SECTION – B

4. (a) Explain different methods of evaporation. 7.5

(b) Explain evaporation and factors affecting the evaporation. 7.5

5. The mass curve of rainfall of duration 100 min. is given below. If the catchment had an initial loss of 0.6 cm and a ϕ-index of 0.6 cm/h, calculate the total surface runoff from the catchment. 15

Time from start of rainfall (min.)	0	20	40	60	80	100
Cumulative rainfall (cm.)	0	0.5	1.2	2.6	2.6	3.5

SECTION – C

6. (a) What is meant by Unit hydrograph and what are the various assumptions ? 7

(b) Explain rational method and empirical formula used for estimation of floods. 8

7. The peak of flood hydrograph due to 3-h duration isolated storm in a catchment is 270m^2/s. The total depth of rainfall is 5.9 cm. Assuming an average infiltration loss of 0.3 cm/h and a constant base flow of 20m^3/s. Estimate the peak of 3-h unit

P. T. O.

hydrograph. If the area of the catchment is 567 km^2. Calculate base width of 3-h unit hydrograph by assuming it to be triangular in shape. 15

SECTION – D

8. (a) Explain functional requirements of water resources projects. 7.5

(b) What is the need for planning of water resource projects ? Discuss briefly the various steps involved in planning of water resources projects. 7.5

9. (a) What is basin wise planning in water resource ? 7.5

(b) What is system analysis in water planning ? 7.5

Roll No. .....

3205

B. Tech. 5th Semester (Civil Engg.) Examination – December, 2022

DESIGN OF STEEL STRUCTURE

Paper : PCC-CE-309-G

Time : Three Hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Section. Question No. 1 is ***compulsory***. All questions carry equal marks. Assume suitable data where required or missing. Use of code IS 800-1984 and Steel Table is allowed.

1. (i) What is stress-strain curve of steel ?

(ii) Sketch different types of bolted connections.

(iii) State the possible failure modes of an axially loaded column. Why is it better to choose plastic or compact sections for columns ?

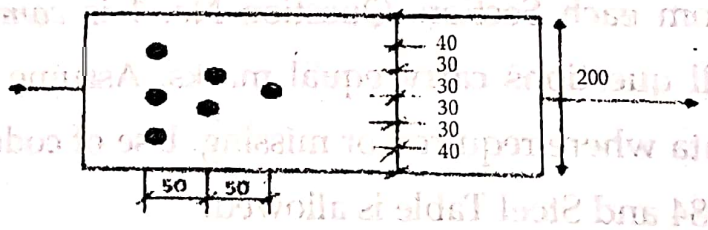
(iv) What is difference between groove weld and fillet weld ?

(v) What are the different types of bracings used in a braced building ? $3 \times 5 = 15$

SECTION – I

2. (a) Explain the purpose of lug angles in tension member connection ? 5

(b) Determine the design tensile strength of the plate 200 × 10 mm with the holes as shown below if the yield strength and ultimate strength of steel are 250 MPa and 410 MPa. M20 bolts and 10 mm thick gusset plates are used. 10



3. A double riveted cover butt joint is used for connecting two plates of 12 mm thickness. The joint is double riveted with cover plates each 8 mm thick. The load to be transferred by the joint is 500 kN. Design the joint and rivets on packing. 15

SECTION – II

4. Desing a built-up consisting of two channels placed back to back to carry an axial factored load of 1900 kN. Design bolted single lacing system also. Length of the column is 10m and both the ends of the column are effectively restrained in direction and position. 15

5. (a) Differentiate between web buckling & web crippling. 5

   (b) Deisgn a two tier grillage foundation to carry an axial load of 1000 kN. A base plate 700 × 700 mm is provided below the stanchion. Use M15 concrete and safe bearing pressure of soil 150kN/m^2. 10

SECTION – III

6. Explain in details IS specifications for gantry girders. Write steps for design of gantry girder. 15

7. A conference hall 8m × 12 m is provided with a 120 mm RCC slab over rolled steel I beams spaced 4m centre to centre. The super imposed load is 4kN/m^2 and floor finish of 1.5 kN/m^2. Design one of the beam as laterally supported. 15

P. T. O.

SECTION – IV

8. Design an I section purlin for an industrial building located at Chennai with Galvanised iron sheets as the roofing material : 15

Span of the truss = 13 m

Spacing of trusses = 6m

c/c Spacing of purlins = 1.2m

c/c Wind pressure intensity = 2 kN/m^2.

Weight of GI sheets = 130N/m^2

Grade of steel : Fe 410

9. Write down design steps of framed and seat connections. 15

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3202

B. Tech. 5th Semester (Civil Engg.) Examination – December, 2022

HIGHWAY ENGINEERING - I

Paper : PCC-CE-303-G

Time : Three Hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Section. Question No. 1 is ***compulsory***. All questions carry equal marks.

1. (i) What is central road fund ?

(ii) Explain with neat sketch the "PIEV" theory ?

(iii) What is the significance of CBR test ?

(iv) How is design hourly volume determined ?

(v) Define the term "Pavement Serviceability Index" with its importance.

(vi) Differentiate between "Geo-Textiles and Geo-Membrane" in highway construction.

SECTION – A

2. (i) What are the various classification of roads ?

(ii) State to explain the general points which need to be considered for ideal location of highways.

3. (i) What is the significance of 'Soil Suitability Analysis and Road Ecology' in highway planning.

(ii) What are the conditions which necessitate taking up of an alignment project of the highway.

SECTION – B

4. The speeds of overtaking and overtaken vehicles are 80 and 60 kmph respectively. If the acceleration of the overtaking vehicles is 2.5 kmph per second. Calculate the safe passing sight distance for (i) one-way traffic (ii) two-way traffic.

5. State the objects of widening pavements on horizontal curves ? What are the factors on which the design of widening depends ? Explain.

SECTION – C

6. Write in details the different types of tests to be conducted to check the suitability of 'Aggregate Materials' in highway materials.

7. What are the modern construction materials used for the construction of pavements ? Explain their characteristics and usage in detail.

SECTION – D

8. (i) Explain the various aspects investigated during parking studies. What are the uses of these studies ?

   (ii) What are the factors on which PCU values depends ?

9. (i) Explain the data collection technique for ITS-Detectors.

   (ii) Explain in brief :

   (a) Geographic Information System

   (b) Automatic Vehicle Identification

B.Tech. (Civil Engg.) 5th Semester G-Scheme

Examination, December–2024

HIGHWAY ENGINEERING-I

Paper-PCC-CE-303-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : ***Question No. 1 is compulsory.*** *Attempt total* ***five*** *questions selecting* ***one*** *question from each unit. All questions carry equal marks.*

1. Compulsory Question : 15

(i) Classification of highway

(ii) How is design hourly volume determined ?

(iii) What is the significance of CBR test?

(iv) Subgrade soil and its function

(v) PIEV theory

Unit-I

2. (a) What factors are considered in finalizing 20 years (1981-2001) plan? 7.5

(b) What is the final location survey? 7.5

3. (a) The area of a certain district in India is 13,400sq.km and there are 12 towns as power 1981 census. Determine the lengths of different categories of roads to be provided in this district by the year 2001. 7.5

(b) Compare the construction methods of Telford and Macadam; bring out the point of differences. 7.5

Unit-II

4. (a) If ruling gradient is 1 in 20. What will be the grade compensation and compensated gradient for a curve of radius 150 m. 7.5

(b) Calculate the stopping sight distance on a highway at a descending gradient of 3% for a design speed of 100 kmph. Assume other data as per IRC recommendation. 7.5

5. (a) Explain Super Elevation. What are the factors on which the design of super elevation depends? 7.5

(b) Define sight distance. State its different types and explain SSD. 7.5

Unit-III

6. (a) Explain the different Engineering properties of aggregate and suitable tests required to check those properties. 7.5

(b) Discuss various factors affecting on subgrade soil strength. 7.5

7. (a) List different types of cutback. When are these used? 7.5

(b) Explain CBR and the test procedure for laboratory and field test. 7.5

Unit-IV

8. Explain :

(i) Geographic Information Systems 7.5

(ii) Traffic Volume (q) & Traffic Density (k) 7.5

9. (a) What are the different techniques used in intelligent transportation system? Describe in details. 7.5

(b) Classify the Regulatory Signs, Warning Signs and Information signs and Mention the objectives with neat sketches. 7.5

B.Tech. (Civil Engineering) 5th Semester G-scheme Examination, December-2024

WATER SUPPLY AND TREATMENT

Paper - PCC-CE-307-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in total. **Question No. 1 is compulsory.** Attempt **one** question from each section. All questions carry equal marks.*

1. Write short notes on following : 6×2.5=15

(i) Turbidity

(ii) Water meter

(iii) Gutter

(iv) Putrefaction

(v) B.O.D.

(vi) R.M.O.

Section-A

2. What is Water Supply System? Explain the Planning and Objectives. 15

3. Explain the Population Forecasting, Water Demands and its Variations. 15

Section-B

4. Design of Slow and Rapid Sand Filtration. 15

5. What is a process for Membrane System? Explain Iron and Manganese Removal, DE fluoridation, Dissolved Solids Removal. 15

Section-C

6. Explain the Pipes and Conduits for Water-Pipe Materials, Laying, Jointing and Testing of Pipes. 15

7. Discuss in detail the utility of air lift pumps in water supply projects. 15

Section-D

8. What is Water Distribution? Explain the Type of Distribution System with example. 15

9. Explain the terms water pollution control and water management. 15

B.Tech.. (Civil Engg.) 5th Semester
(G-Scheme) Examination, December-2024
ENGINEERING GEOLOGY
Paper - PCC-CE-311-G

Time allowed : 3 hours] *[Maximum marks : 75*

Before answering the questions, candidate should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : *Attempt **five** questions in all, selecting **one** question from each section. **Question No. 1 is compulsory.** All questions carry equal marks.*

1. Describe the following : 15

(a) Sub division of Geology

(b) Soil Profile

(c) Volcanoes

(d) Folds and Faults

(e) NIRM

Section - A

2. Explain the causes of erosion of surface of earth and method of its prevention. 15

3. Explain the internal and external forces causing changes in the formation of structure. 15

Section - B

4. (a) Explain different types of rocks.

   (b) What are the physical properties of mineral used for the identification? 15

5. What is metamorphic grades and also explain the agents and types of Metamorphism? 15

Section - C

6. (a) Explain the various parts of faults.

   (b) Explain the importance of geological structure in civil engineering projects. 15

7. (a) Write an essay on Ground Water and Engineering Practice.

   (b) What is aquifers and also explain its types and functions. 15

Section - D

8. Explain the different types of rocks and unfavorable conditions in sedimentary rocks. 15

9. (a) Write the use of remote sensing technique for hydrological survey of the site.

   (b) Explain the uses of geological maps and interpretation of data. 15

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(Graph Paper)

B.Tech. (Civil Engg) 5th Semester G-scheme

Examination, December-2024

SOIL MECHANICS

Paper - PCC-CE-305-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in all. All questions carry equal marks. **Question No. 1 is compulsory.** Attempt **one** question from each section.*

1. (i) Define degree of saturation and shrinkage ratio.

(ii) Differentiate between plasticity and consistency.

(iii) State the assumptions in construction of flow net.

(iv) What is Quick sand condition? List the conditions for the occurrence of quick sand condition.

(v) Describe Triaxial shear test. What are its merits and demerits?

(vi) Explain the terms immediate settlement and co-efficient of volume compressibility.

6×2.5=15

Section-A

2. (a) A partially saturated soil from an earth fill has a natural water content of 22% and a bulk unit weight of 19 kN/m^3. Assuming the specific gravity of soil solids as 2.65, Compute the degree of saturation and void ratio. If subsequently the soil gets saturated, determine the dry density, buoyant unit weight and saturated unit weight. 10

(b) Discuss about the grain size distribution of soil by (i) Sieve analysis, (ii) Sendimentation analysis. 5

3. (a) Discuss Indian Standard classification system. 5

(b) What are the factors affecting permeability of soil? The falling head permeability test was conducted on a soil sample of 4cm diameter and 18cm length. The head fell from 1.0m to 0.40m in 20 minutes. If the cross-sectional area of the stand pipe was 1cm^2, determine the coefficient of permeability. 10

Section-B

4. (a) What is quick sand condition? Calculate hydraulic gradient for this case. 7

(b) Find the value of the effective stress at 2m, 4m, 6m, 8m and 10m is a soil mass having γs = 21 kN/m^3. Water table is 2m below ground surface. Above water table there is capillary rise up to ground surface. Also draw total stress diagram upto 10.00m. 8

5. (a) Explain the factors affecting rate of compaction of a soil mass. 7

(b) Draw the compaction curve and explain the procedure to determine OMC and Maximum Dry density. 8

Section-C

6. (a) Discuss in detail about the Boussineq's analysis to find vertical stress and horizontal shear stress for point load. 8

(b) Explain Newmark's influence chart. 7

7. (a) Derive the equation for Terzaghi's theory of one dimensional consolidation with a neat sketch. 8

(b) A 5m thick saturated soil stratum has a compression index of 0.25 and coefficient of permeability 3.2×10^{-3} mm/sec. If the void ratio is 1.9 m at vertical stress of 0.15 N/mm^2. Compute the void ratio when the vertical stress is increases to 0.2 N/mm^2, also Estimate the settlement due to above stress increase and time required for 50% consolidation and 90% consolidation. 7

Section-D

8. Explain briefly Vane shear test of soil. Explain the triaxial shear tests based on drainage and their applicability. Mention its merits and demerits. 15

9. (a) How to calculate active earth pressure graphically when a line load is acting on the ground surface? 5

   (b) What is the effect of cohesion on active earth pressure and passive earth pressure? Explain with earth pressure distribution diagram. 10

B.Tech. (Civil Engg.) 5th Semester (G-Scheme)

Examination, December-2024

HYDROLOGY AND WATER RESOURCE ENGINEERING

Paper -PCC-CE-301-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt any **five** questions in total, selecting **one** question from each section. **Question No. 1 is compulsory.** All questions carry equal marks.*

1. Write short note on following: 6×2.5=15

(a) Precipitation

(b) Hydrograph

(c) Non-recording gauges

(d) Catchment area

(e) Classification of run-off

(f) Actual evapotranspiration

Section-A

2. (a) What is the hydrological cycle? Give a brief description of different components of a hydrologic cycle. 8

(b) Write the application of hydrology in the engineering purpose. 7

3. A catchment area has seven rain gauge stations. In a year the rainfall recorded by the gauges are as follows

Station	P	Q	R	S	T	U	V
Rainfall (cm)	130.0	142.0	118.0	108.0	165.0	102.0	147.0

For an error of 10% in the estimation of the mean rainfall, Calculate the minimum number of additional stations required to be established in the area. 15

Section-B

4. (a) Differentiate between the infiltration capacity and the infiltration index. 7.5

(b) Explain evaporation and factors affecting the evaporation? 7.5

5. The mass curve of rainfall of duration 100 min. is given below. If the catchment had an initial loss of 0.6cm and a ϕ-index of 0.6cm/h, calculate the total surface runoff from the catchment. 15

Time from start of rainfall (min)	0	20	40	60	80	100
Cumulative rainfall (cm)	0	0.5	1.2	2.6	2.6	3.5

Section-C

6. (a) Explain procedure to derive S-curve hydrograph from a given unit hydrograph. Also describe the uses of S-curve hydrograph. 7

(b) Explain rational method and empirical formula used for estimation of floods. 8

7. The peak of flood hydrograph due to 3-h duration isolated storm in a catchment is 270m^2/s. the total depth of rainfall is 5.9cm. Assuming an average infiltration loss of 0.3cm/h and a constant base flow of 20m^3/s. Estimate the peak of 3-h unit hydrograph. If the area of the catchment is 567km^2. Calculate base width of 3-h unit hydrograph by assuming it to be triangular in shape. 15

Section-D

8. (a) Explain functional requirements of water resource projects. 7.5

(b) What is the need for planning of water resource projects? Discuss briefly the various steps involved in planning of water resource projects. 7.5

9. (a) What is basin wise planning in water resource? 7.5

(b) What is system analysis in water planning? 7.5

B.Tech. (Civil Engg.) 5th Semester (G-Scheme)

Examination, December-2024

DESIGN OF STEEL STRUCTURE

Paper -PCC-CE-309-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt any **five** questions in all, selecting **one** question from each unit. **Question No. 1 is compulsory.** All questions carry equal marks.*

1. (a) Define plastic hinge and plastic collapse.

(b) Define load factor and shape factor.

(c) What are the various factors affecting strength of tension member?

(d) Differentiate between laced column and battened column.

(e) Define throat thickness and gross diameter of rivet.

(f) Describe various components of a Gantry girder.

6×2.5=15

Unit-I

2. A single riveted double cover butt joint in used to connect two plates 16mm thick with chain riveting. The rivets used are power driven 20mm in diameter at a pitch of 60mm. Find the safe load per pitch length and efficiency of the joint. 15

3. Define physical, mechanical and chemical properties of structural steel and also State the assumptions in the theory of riveted joints. 15

Unit-II

4. Design a suitable flat 10mm thick to act as a tie member in a roof truss and subjected to an axial pull to 140 kN. Use $\sigma_{at} = 150 N/mm^2$, $\tau_{vf} = 100 N/mm^2$, $\sigma_{pf} = 300 N/mm^2$ and diameter of rivets = 18mm. 15

5. Design a double angle discontinuous strut to carry a load of 90 kN. The length of the strut is 3m between intersections. The two angles are placed back to back (with long legs connected) and are tack riveted.

   (a) Angles are placed on opposite sides of 12 mm gusset plate.

   (b) Angles are placed on same side of 12 mm gusset plate.

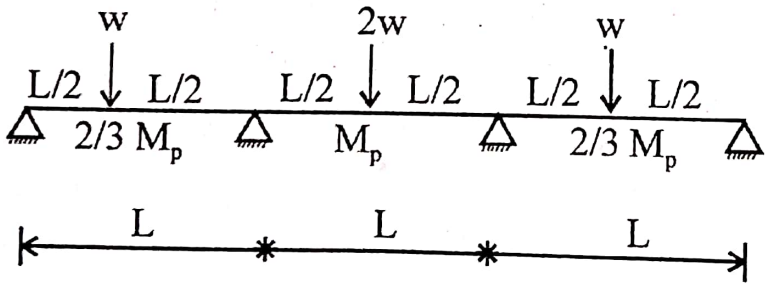
Unit-III

6. Design a beam of 6.5m effective span carrying a uniform load 30 kN/m if the compression flange is laterally unsupported. Assuming $f_Y = 250\ N/mm^2$. 15

7. Two columns I.S.H.B. 350@ 661.2N/m and I.S.H.B. 400@ 759.3N/m are spaced 6m c/c. The Columns carry loads 1100 kN & 1800 kN respectively. Design a combined grillage foundation for the columns. Bearing pressure of the earth is 200 kN/m^2. 15

Unit-IV

8. Determine the collapse load for the continuous beam section as shown in figure. 15



9. Design a gantry girder to be used in an industrial building carrying an electric overhead travelling crane, for the following data: 15

Crane capacity	200 kN
Self-weight of the crane girder excluding trolley	200 kN
Self-weight of the trolley, electric motor, hook, etc.	40 kN
Approximate minimum approach of the crane hook to the gantry girder	1.20 m
Wheel base	3.5 m
c/c distance between gantry rails	16 m
c/c distance between columns (span of gantry girder)	8 m
Self-weight of the rail section	300 N/m
Yield stress of steel	250 N/mm^2

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B. Tech. 5th Semester (Civil Engg.) Examination – March, 2021

DESIGN OF STEEL STRUCTURE

Paper : PCC-CE-309-G

Time : Three hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any ***five*** questions. All questions carry equal marks. Question No. **1** is ***compulsory***. Attempt ***one*** question from each Section. Assume suitable data where required or missing. Use of code IS 800-1984 and Steel Table is allowed.

1. (a) What is Necking of steel sections ?

(b) Write the formula to calculate the efficiency of Bolt Joint.

(c) List some of the pinned connection used in steel structures.

(d) State the possible failure modes of an axially loaded column.

(e) What is difference between lacing and battens ?

(f) What is difference between laterally restrained and un-restrained sections ?

(g) Define the term - Pitch of a rivet.

(h) Differentiate nominal diameter and gross diameter of bolt.

(i) What are the different types of bracings used in a braced building ?

(j) Write types of stiffners. $1.5 \times 10 = 15$

SECTION – A

2. The plates of a tank 8 mm thick are connected by a single bolted lap joint with 20 mm diameter bolts at 50 mm pitch. Calculate the efficiency of the joint. Assume Fe 410 plate and grade 4.6 bolts. 15

3. A double riveted cover butt joint is used for connecting two plates of 12 mm thickness. The joint is double riveted with cover plates each 8 mm thick. The load to be transferred by the joint is 500 kN. Design the joint and rivets on packing. 15

SECTION – B

4. Design a built up column with two channels placed back-to-back and separated apart. The column is of 6 m effective length and supports a factored load of 1500 kN. Also design the bolted lacing system. Assume fy = 250 MPa. 15

5. (a) Differentiate between web buckling & web crippling. 5

   (b) Write in details design procedure for gusset plate. 10

SECTION – C

6. An ISLB600@976.1 N/m has been used as a simply supported beam over a span of 7.2 m. Determine the safe uniform load that the beam can carry in flexure if the compression flange of the beam is restrained against lateral buckling. 15

7. A conference hall 8 m x 12 m is provided with a 120 mm RCC slab over rolled steel I beams spaced 4 m centre to centre. The super imposed load is 4 kN/m^2 and floor finish of 1.5 kN/m^2. Design one of the beam as laterally supported. 15

SECTION – D

8. A purlin is to be designed to support a GI sheet as roofing material for a truss spaced at 3.5 m c/c. Purlin along the principal rafters are arranged at a distance of 1.35 m c/c. The pitch of truss is 0.2 m. Design a section for the purlin. Assume basic wind speed as 44 m/s. 15

9. (a) Explain in details design steps of bearing stiffners. 5

(b) Differentiate between welded and riveted plate girders. 10
