Code No.: **30120/40120**

MR13 & MR14

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

III B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: **Steel Structures Design and Drawing**

Branch: **CE**

Time: 3 hours **Max. Marks: 75**

Note: Assume suitable data whenever necessary. Use of IS 800-2007, Steel Tables & IS- 875- Part-3 is permitted

PART-A

Answer the following Questions **1×30=30M**

1. Design a built-up column 10m long to carry a factored axial load of 1080kN. The column is restrained position but not in direction at both ends. Provide single lacing system with bolts. Assume the column to be consisting of two channels back to back. Assume Fe 410 steel and bolts of grade 4.6. Draw front view, side view and sectional view.

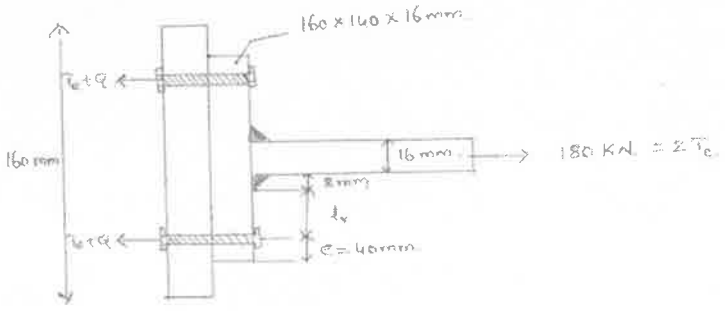
(OR)

2. Design a king post truss for a span of 6m, which is located at Delhi. Maximum size of the building is 20×6 meters, Height=10m, pitch=1/6, spacing of purlins-1.00m.Assume suitable data required. Draw the elevation of the truss.

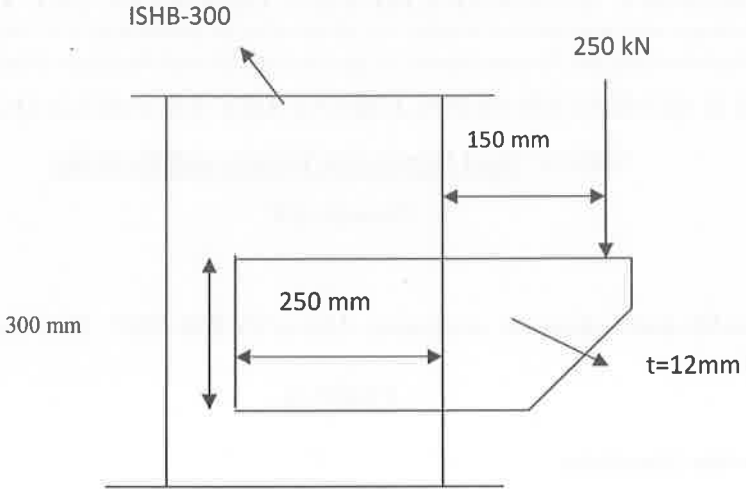
PART-B

Answer any three of the following Questions **3×15=45M**

1. Two ISF sections 200mm x 10mm each and 1.5m long are to be jointed to make a member length of 3m. Design a butt joint with bolts arranged in a diamond pattern. The flats are supposed to carry a factored tensile force of 450KN. Steel is of grade Fe 410. Bolts of grade 4.6 and diameter 20mm are used to make the connections. Also determine the net tensile strength of the main plate and cover plates.
2. The joint shown in figure has to carry a factored load of 180 KN. End plate used is of size 160mmX16mm. The bolts used are M 20 HSFG bolt of grade 8.8 check whether the design is safe?



3. Calculate the size of weld for the bracket shown in figure below.



4. Design a welded plate girder 24m in span and laterally restrained throughout. It has to support a uniform load of 100kN/m throughout the span exclusive of self weight. Design the girder using intermediate transverse stiffeners. The steel for the flange and web plates is of grade Fe 410. Design the cross section, the end load bearing stiffener and connections. Use post critical method for the design.

5. a) Discuss about selection or choice of truss member section. **(5M)**

   b) Design a Channel-section Purlin for the following data:

   Span of roof= 12 m

   Spacing of Purlins = 2 m

   Spacing of truss=4m

   Slope of roof truss= 1 vertical to 2 horizontal

   Weight of G.I. sheeting = 140 N/m^2

   Wind load intensity normal to roof = 1000 N/m^2 **(10M)**

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Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

III B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: **Foundation Engineering**

Branch: **CE**

Time: 3 hours **Max. Marks: 75**

PART-A

I. Answer ALL Questions of the following **5x1M=5M**

1. List commonly used type of soil samplers.
2. What are the different factors of safety used in the stability of slopes?
3. List the types of retaining walls.
4. Write Terzaghi's bearing capacity equation for strip and circular footings.
5. Mention different shapes of well foundations.

II. Answer ALL Questions of the following **10x2M=20M**

1. Write about various details presented in site investigation report.
2. What are the uses of pressure meter?
3. Discuss about Taylor's Stability Number.
4. Define critical depth .What are the factors governing it?
5. Compare Rankine's theory and Coulomb's theory.
6. Define coefficient of earth pressure at rest.
7. State plate load test's limitations.
8. Write about Meyerhoff's correction factors for the analysis of bearing capacity of a strip footing at any depth.
9. Write about classification of piles based on different criteria.
10. Explain dynamic formula for pile foundation.

PART-B

Answer ALL Questions of the following **5x10M=50M**

1. a) Sketch a typical Bore log and describe its features.
   b) State the objectives of soil exploration.

(OR)

2. Explain the test procedure for Dynamic cone penetration test mentioning its correlation with standard penetration test results for medium sands.

3. a) What are the modes of failure of slopes? Illustrate with sketches. **(4M)**

   b) Calculate the factor of safety with respect to cohesion of clay slope laid at 1 in 2 to a height of 10m, if $\varphi=12^0$, $c=25kN/m^2$ and $\gamma=19kN/m^3$. Calculate the safe height of the embankment for a factor of safety of 1.5. Assume the stability number as 0.91. **(6M)**

(OR)

4. An embankment of 16m is to be made from a soil with a factor of safety of 1.5 for the embankment slope. Soil properties are $c_u=20kN/m^2$, $\emptyset_u=22^o$, $\gamma=19kN/m^2$. Determine the safe angle of slope using Taylor's chart.

5. a) How is structural and foundation stability of a retaining wall checked? **(3M)**

   b) A retaining wall 6m high, with a smooth vertical back is pushed against a soil mass having $c'= 40kN/m^2$ and $\Phi'=15°$ and $\gamma =19kN/m^3$. What is the total Rankine passive pressure, if the horizontal soil surface carries a uniform load of $50kN/m^2$? What is the point of application of the resultant thrust. **(7M)**

(OR)

6. Explain step by step procedure to determine active earth pressure for cohesionless soils by Culmann's graphical method with a neat sketch.

7. A square footing carries a load of 800kN. The depth of the footing is 1.5m. The properties of the soil are c=0, $\varphi=38^o$, and $\gamma=18.5kN/m^3$. Determine the size of the footing for a factor of safety of 3 against shear failure. What will be the changes in the size of the footing, if the water table rises to ground level. (For $\varphi=38^o$, the Nc=52, Nq=49 and $N_\gamma=64$).

(OR)

8. Determine the safe bearing capacity of a strip footing 1.6m wide which is located at a depth of 1.2m below ground surface in a soil having $\gamma = 18kN/m^3$, $c =17.5kN/m^2$, and $\emptyset= 25°$. Assume a factor of safety of 3.0. Terzaghi's bearing capacity factors for $\emptyset = 25°$ are $Nc = 25.1$, $Nq = 12.7$, and $N\gamma = 9.7$, what is the permissible load per metre run of the footing.

9. What are the problems that are encountered in well sinking? Describe the methods adopted for rectifying those problems with neat sketches.

(OR)

10. Determine the ultimate load capacity of the pile group of 16 piles of 45cm diameter which are arranged with a centre to centre spacing of 1.0 m. These piles are 8m long and are embedded in a clayey soil with cohesion $c =23kN/m^2$. Neglect bearing resistance. Take $\alpha=0.6$.

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III B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: **Transportation Engineering-I**

Branch: **CE**

Time: 3 hours **Max. Marks: 75**

PART-A

I. Answer ALL Questions of the following **5x1M= 5M**

1. Brief about IRC.
2. Write the importance of Geometric Design.
3. What are the numbers of cars that can be parked along the kerb length of 50m with 45^0? The standard car dimensions are 5.4m x 2.5m.
4. What is grade separation?
5. What are the main types of Flexible Pavements?

II. Answer ALL Questions of the following **10x2M=20M**

1. List out Different Road Development Plans.
2. Write about Roman roads.
3. Find out the ruling minimum and absolute minimum radii for national highway in a rolling terrain for ruling design speed of 120kmph and minimum design speeds of 100kmph.
4. Write about intermediate Sight Distance.
5. Write about Basic parameters of traffic.
6. List out the different types of On-street parking facilities.
7. Write examples of Grade Separated Intersections.
8. Give the advantages of rotary intersection.
9. Draw the cross-section of semi-rigid pavement about all weather roads & Fair weather roads.
10. Write down the formula for radius of equivalent resisting section in Westergaard's theory.

PART-B

Answer ALL Questions of the following **5x10M=50M**

1. Discuss about the road development in India in a chronological order.

[OR]

2. a) Explain different road network patterns with the help of neat sketches.

   b) Write the Recommended values of camber for different types of road surfaces.

3. Write about the design of vertical curves and explain with an example

[OR]

4. a) Derive an expression for the super elevation on highways. **[6M]**

   b) Write in detail about the design steps of super elevation as per IRC. **[4M]**

5. Write in detail about Road safety Audits?

[OR]

6. a) What are the causes of road accidents and what kind of preventive measures can be adopted to reduce road accidents? Explain.

   b) Define Traffic Volume, Speed and Density. What are the units in which each of these Parameters are measured? Explain.

7. a) What situations justify the requirements of grade separated intersections?

   b) What are the basic forms of grade – intersection? Give sketch showing the details of each type.

[OR]

8. Draw the neat sketches of

   i) Rotary Interchange **[3m]**

   ii) Partial Clover Leaf **[3m]**

   iii) Full Clover Leaf **[4m]**

9. Using the data below, calculate the wheel load stresses at (a) interior (b) edge (c) corner regions of a cement concrete pavement using Westergaard stresses equations.

   Wheel load p=5100 kg

   modulus of elasticity of cement concrete $E=3\times10^5$ kg/cm^2

   Pavement thickness h=18 cm

   Poisons Ratio of concrete $\mu=0.15$

   Modulus of sub grade Reaction k=6.0 kg/cm^3

   Radius of contact area a=15cm

[OR]

10. Write in detail about distribution of commercial Traffic over the carriage way and write the expression for computation of design traffic for flexible pavement as per IRC 37-2012.