# 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: **Environmental Engineering**

Branch: CE

Time: 3 hours                                                                                     Max. Marks: 75

## PART-A

**I. Answer ALL questions of the following**                                         5 x 1M=5 M

1. What is Design Period?

2. What is a service reservoir?

3. Name any three types of valves used in water distribution system.

4. What is biodegradable matter?

5. What is a septic tank?

**II. Answer ALL questions of the following**                                      10 x 2M=20 M

1. List 6 important considerations for Public water supply.

2. Explain the Geometrical Increase method of forecasting population.

3. What is pre chlorination?

4. What are the methods of Disinfection?

5. List 5 advantages and 5 disadvantages of metering.

6. Write a short note on Hardy Cross method.

7. What is the end product of anaerobic digestion of sludge?

8. Define Aerobic decomposition and Anaerobic decomposition.

9. Differentiate between high rate and normal rate trickling filters.

10. Write about soak pits.

## PART-B

**Answer ALL questions of the following**                                          5 x 10 M=50 M

1.             The population of 5 decades from 1930 to 1970 are tabulated below. Find out the population after one, two and three decades beyond the last known decade, by using arithmetic increase method, Geometrical & Incremental increase method

| Year | 1930 | 1940 | 1950 | 1960 | 1970 |
|------|------|------|------|------|------|
| Population | 25000 | 28000 | 34000 | 42000 | 47000 |

### [OR]

2. a) Explain the various physico-chemical water quality parameters & its importance

   b) Mention the Drinking water quality standards in India.

3. The population of a town is 100000 and the average per capita demand is 135 litres/day/capita. Design the coagulation cum-sedimentation tank for the water works, supplying water to the town. Maximum demand may be taken as 1.5 times the average demand. Assume detention periods of 5 hours and 30 minutes for settling tank and floc chamber respectively. Flow velocity 12 cm/min.

**[OR]**

4. Discuss the usage of Coagulation and Flocculation methods in water treatment process. Explain the Design principle and Dosage.

5. Explain the different Testing methods of Pressure pipelines, Non-pressure pipelines, renovated pipelines, valves and water retaining structures(reservoirs)

**[OR]**

6. a) Define BOD, COD and DO? And write differences between conservancy and water carriage method

   b) Draw and Explain about Manholes and lamp holes

7. a) Discuss briefly, the combined and separate sewerage systems, and their suitability.

   b) If the 3 days 25°C BOD of a sample of sewage is 250 mg/l. What will be its 5 days 30°C BOD?

**[OR]**

8. Discuss in detail Sewers along with any 5 common sewer sections with neat diagrams.

9. a) Discuss various methods of ultimate disposal of sewage. Also mention the relative merits and demerits of each method.

   b) Design a conventional activated sludge treatment unit for the following data.

   Assume F/M ratio as 0.2 and MLSS as 3200 mg/l

   Population = 125000

   Per capita sewage flow = 150 litres/d

   BOD of influent sewage =200mg/l

   BOD of treated effluent = 20 mg/l

**[OR]**

10. a) Write about sludge Activation process with the help of a neat sketch and Explain the waste water treatment methods

   b) Write the Disposal methods of Waste water and Sludge

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

Subject: **Engineering Geology**

Branch: CE

Time: 3 hours                                                                                              Max. Marks: 75

### PART – A

**I. Answer ALL questions of the following**                                          **5x1Mark=5 Marks**

1. What is weathering?
2. Define the term "Specific gravity".
3. What do you mean by folds?
4. Define epicenter.
5. What do you mean by permeability?

**II. Answer ALL questions of the following**                                        **10x2Mark=20 Marks**

1. Distinguish between Abrasion and Attrition related to engineering geology.
2. What is the importance of Weathering over the properties of rocks? What are the types of Weathering?
3. Define Structure and Texture of Igneous rocks.
4. Define structure of sedimentary &metamorphic rocks
5. Define unconformities. Explain how they are recognized in a field.
6. What is the importance of geophysical investigations? What is meant by seismic zoning? In how many seismic zones has India been divided?
7. Enumerate the important parts of a dam.
8. What is meant by mining substances?
9. What is a spring? What are the types of springs?
10. Which areas of India are prone to major landslides?

### PART-B

**Answer ALL questions of the following**                                          **5x10 Marks= 50Marks**

1. Explain clearly the Physical Factors of weathering of rocks.

**[OR]**

2. a) What is the importance of Geology from Civil Engineering point of view?        **(6M)**

   b) What are the disciplines involved in Engineering Geology explain them in

   detail.                                                                              **(4M)**

3. Write the physical properties of Dolerite and pegmatite.

**[OR]**

4. Explain about physical properties of the fallowing minerals

   a) Talc    b) Calcite   c) Garnet d) Pyrolusite

5. List the advantages and applications of Geophysical investigations.

**[OR]**

6. Discuss the following geophysical techniques, briefly highlighting their importance.

   (a) Gravity method.                                                                  **(5M)**

   (b) Thermal method.                                                                  **(5M)**

7. What are reservoirs? What are the requirements needed for a successful reservoir?

**[OR]**

8. a) What are the types of Dams? Explain with neat sketches.                           **(5M)**

   b) What are the Geological considerations for the selection of Dam site?             **(5M)**

9. Explain the following:

   a) Types of Ground water                                                             **(4M)**

   b) Advantages of Ground Water Exploration                                            **(3M)**

   c) Application of Cone of Depression                                                 **(3M)**

**[OR]**

10. Distinguish between the following:

   a) Porosity and permeability.                                                        **(3M)**

   b) Confined and unconfined aquifers.                                                 **(4M)**

   c) Open well and bore well.                                                          **(3M)**

Code No.: 401B4

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

Subject: **Environmental Impact Assessment and Management**

Branch: CE

Time: 3 hours                                                           Max. Marks: 75

## PART – A

**I. Answer ALL questions of the following**                    5x1Mark=5 Marks

1. What are the benefits of EIA?
2. What are the causes for deforestation?
3. Write the impacts of biological environment on terrestrial vegetation.
4. Define compliance audit.
5. What is wild life Act?

**II. Answer ALL questions of the following**                   10x2Mark=20 Marks

1. Write two environmental parameters.
2. Discuss about study team in an EIA Process.
3. Define desertification.
4. Differentiate between deforestation and forest degradation.
5. What is the relationship between land use and air quality?
6. Write a flow chart explaining EIA methodology for assessment of impacts on air environment.
7. Write a note on post audit activities.
8. Mention different types of environmental Audit.
9. How did fatal incident occur in Bhopal?
10. What are the environmental impacts of constructional activities?

## PART-B

**Answer ALL questions of the following**                       5x10 Marks= 50Marks

1. Give the advantage of scaling checklist method over simple and descriptive checklist method.

**[OR]**

2. Write a note on assessment of impact significance and evaluate incorporation of mitigation measures in EIA.

3. Explain the following:

   a) How to assess the impact significance on the soil due to project activity?

   b) Give the systemic approach for the study of Environmental impact on soil.

**[OR]**

4. a) Discuss the important aspects of assessment of impacts of any developmental activity on vegetation and wildlife

   b) Explain the concept of deforestation.

5. Discuss the general methodology for the assessment of impacts of developmental activities on surface water environment.

**[OR]**

6. Write the different types of projects that have an adverse impact on soil with specific reference to soil erosion.

7. Explain the following:

   a) Write the advantages of Environmental Audit.

   b) Explain energy audit.

**[OR]**

8. a) Write a note on Preparation of Audit Report

   b) Write a note on Environmental legislation

9. Explain the salient features of the following:

   a) Environmental protection Act.

   b) Air (prevention & control of pollution Act).

**[OR]**

10. How do you define the pollution as per water Act, 1974? Also write the salient features of this Act.

Code No.: 401B2

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

Subject: **Ground Improvement Techniques**

Branch: CE

Time: 3 hours                                                                        Max. Marks: 75

## PART – A
**I. Answer ALL questions of the following**                    **5x1Mark=5 Marks**
 1. How sumps and ditches are used in dewatering?
 2. What are the methods of heating the soil in-situ?
 3. What is Rankines passive earth pressure?
 4. What is geosynthetics?
 5. What are the tests for identification of expansive soil?

**II. Answer ALL questions of the following**                    **10x2Mark=20 Marks**
 1. What are the various applications of grouting?
 2. Discuss basic function of grouting.
 3. Write short notes on Thermal methods.
 4. How densification causes impact at the ground surface?
 5. How does reinforced earth differ from reinforced cement concrete?
 6. What is the angle made by the failure plane in rein forced earth wall and explain?
 7. What are the properties of geosynthetics?
 8. What is Geosynthetic Clay Liner? Explain its purpose.
 9. "In Bitumen stabilization, higher the volatile content in Bitumen, better is the quality of stabilization". Answer Yes or No and justify
 10. List out the various methods of determination of swell pressure.

## PART-B
**Answer ALL questions of the following**                    **5x10 Marks= 50Marks**
 1. What are the main functions of dewatering systems to improve the geotechnical characteristics of a ground?
**[OR]**
 2. What are the various methods of dewatering systems used for control of ground water in stabilizing the ground and discuss each method in detail?
 3. Explain the method of Vibroflotation applied for compaction of granular soils at depth, with the help of neat sketches.
**[OR]**
 4. Explain in detail the method of dynamic consolidation of cohesive soil.
 5. Discuss with neat sketches the components of reinforced earth wall and list the various applications of reinforced earth structures.
**[OR]**
 6. How do you check the external stability of a reinforced earth wall?
 7. Write short notes on the following
     a) Erosion control          b) Slope protection
**[OR]**
 8. Describe the uses of geotextile and geomembranes in the road works.
 9. What is Mechanical stabilization? Explain the procedure in detail.
**[OR]**
 10. Explain briefly about under-reamed piles with neat sketch.

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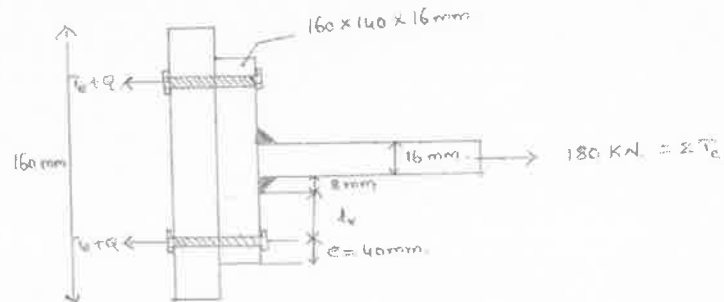
3. Calculate the size of weld for the bracket shown in figure below.

ISHB-300

250 kN

150 mm

300 mm

250 mm

t=12mm
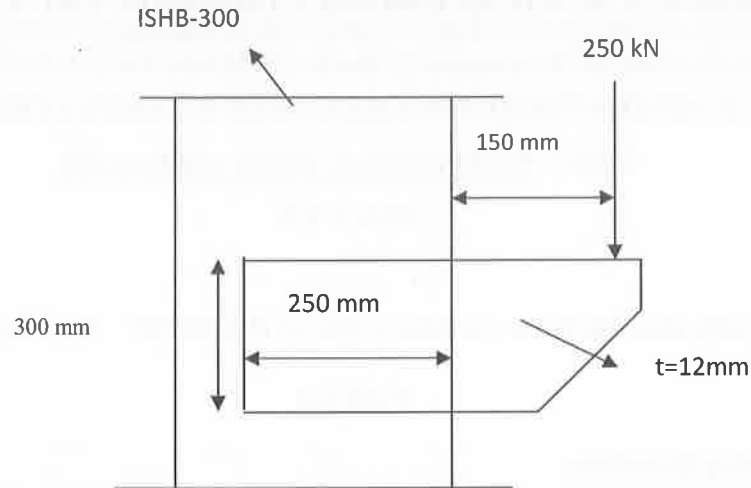
4. Design a welded plate girder 24m in span and laterally restrained throughout. It has to support a uniform load of 100kN/m throughout the span exclusive of self weight. Design the girder using intermediate transverse stiffeners. The steel for the flange and web plates is of grade Fe 410. Design the 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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## 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 $\varphi = 12^0$, $c = 25 kN/m^2$ and $\gamma = 19 kN/m^3$. 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 $c_u = 20 kN/m^2$, $\emptyset_u = 22^0$, $\gamma = 19 kN/m^2$. 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 $c' = 40 kN/m^2$ and $\Phi' = 15°$ and $\gamma = 19 kN/m^3$. What is the total Rankine passive pressure, if the horizontal soil surface carries a uniform load of $50 kN/m^2$ ? 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 $c = 0$, $\varphi = 38°$, and $\gamma = 18.5 kN/m^3$. 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 $\varphi = 38°$, 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 $\gamma = 18 kN/m^3$, $c = 17.5 kN/m^2$, 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 $c = 23 kN/m^2$. Neglect bearing resistance. Take $\alpha = 0.6$.

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

Subject: <u>Transportation Engineering-I</u>

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?

<div align="center">[OR]</div>

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.

<div align="center">[OR]</div>

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

<div align="center">[OR]</div>

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.