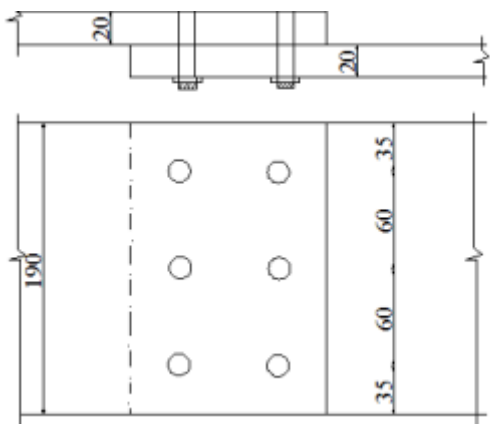
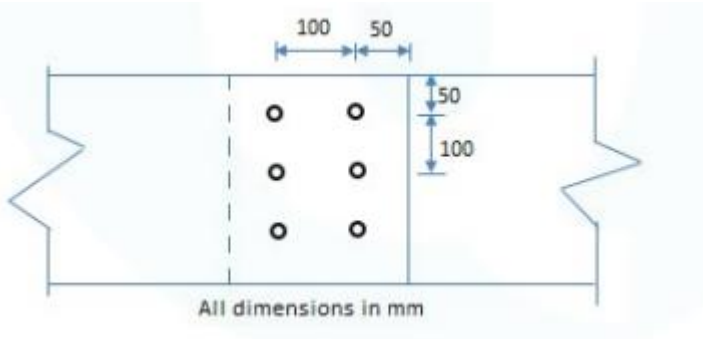


**DESIGN OF STEEL STRUCTURES CET401**

**MODULE 1**

Sl no	Questions	Marks	Source
1	Explain the concept of limit state method of design	4	Dec 2018
2	Sketch and explain various failures of bolted connection	4	Dec 2018
3	Design a lap joint between the two plates of width 150 mm, if the thickness of one plate is 12 mm and the other is 10 mm. The joint has to transfer a working load of 100 kN. The plates are of Fe 410 grade. Use bearing type bolt	10	Dec 2018
4	Write any six features of structural steel	3	Dec 2018
5	Find the efficiency of the lap joint shown in Fig.1. Given M20 bolts of grade 4.6 and Fe 410 plates are used  	12	Dec 2019
6	Determine the tensile strength of ISA 125 x 95 x 8 mm connected to the gusset plate of 10mm through the shorter leg by 4, M20 bolts arranged in one row. The grade of steel is Fe410. Take p = 65 mm ,Edge & End distance = 40mm	12	May 2019

7	<p>Design a double cover joint between the two plates of width 300 mm, if the thickness of one plate is 18 mm and the other is 10 mm. The joint has to transfer a working load of 260 kN. The plates are of Fe 410 grade. Use bolt of grade 4.6</p>	12	Dec 2019
8	<p>Determine the strength and efficiency of a bolted lap joint shown in figure. The bolts are of 20mm diameter, grade 4.6. The plates are of 12mm thick and grade Fe410.</p>  <p style="text-align: center;">All dimensions in mm</p>	12	Sep 2020
9	<p>a) Differentiate between bearing type connection &amp; friction type connection. b) Explain the failures of bolted joints</p>	5	Sep 2020
10	<p>An ISMC 250 @ 298kg/m is used as a tie member to transmit a factored load of 800kN. The channel section is connected to a gusset plate of 10mm thickness. Design a fillet weld if the lap length is limited to 300mm. Provide slot welds if required.</p>	12	Dec 2018

## MODULE 2

1	a)With the help of suitable diagram, explain the concept of shear lag.	3	Dec 2018
	b) Design a suitable double angle section to carry a factored tensile load of 450 kN. The length of the member is 2.9m. Use M20 bolts of 4.6 grade. The grade of steel is Fe410.	12	
2	Determine the design tensile strength of the plate 200 x 10mm with the holes as shown below if the yield strength and ultimate strength of steel are 250MPa and 410MPa. M20 bolts and 10mm thick gusset plates are used.	12	Dec 2018
3	A tie member consisting of an angle section ISA100x75x8, designed to transfer a factored axial load of 280kN, is to be welded to a gusset plate of 10mm thick, using 6mm fillet weld. Design the weld, if the weld is provided on three sides by overlapping the angle on the gusset plate, at a shop. Also sketch the connection showing the weld length	10	Sep 2020
4	A tie member of a roof truss consisting of an angle section ISA 75 x75x10 of Fe 410 grade, is welded to a 10mm thick gusset plate. Design a weld to transmit a load equal to full strength of the member. Assume shop welding	10	Sep 2020
5	a)Under what circumstances do we use slot welds and plug welds?	3	Dec 2019
	b) Explain block shear failure.	3	
	c) What is a lug angle?	3	
6	a)What is a lug angle?	3	Dec 2019
	b) Design a bridge truss diagonal carrying a pull of 200kN using double angle section. The centre to centre distance of intersections is 3m. The member is subjected to reversal of stresses.	12	
7	a)Write any six features of structural steel	3	Dec 2018
	b) An ISMC 250 @ 298kg/m is used as a tie member to transmit a factored load of 800kN. The channel section is connected to a gusset plate of 10mm thickness. Design a fillet weld if the lap length is limited to 300mm. Provide slot welds if required	12	

<b>8</b>	With the help of suitable diagram, explain the concept of shear lag.	3	Dec 2018
<b>9</b>	Determine the tensile strength of ISA 125 x 95 x 8 mm connected to the gusset plate of 10mm through the shorter leg by 4, M20 bolts arranged in one row. The grade of steel is Fe410. Take $p = 65$ mm, Edge & End distance = 40mm	12	May 2019
<b>10</b>	Explain the purpose of lug angles in tension member connection?	3	May 2019

### MODULE 3

<b>1</b>	Explain the classification of cross sections as per the IS 800: 2007 based on yield and plastic moments & rotational capacities.	5	Sep 2020
<b>2</b>	Determine the design compressive load capacity of a column made of a rolled steel section ISMC200@217N/m if length of the column is 3m, with both ends fixed.	10	Sep 2020
<b>3</b>	An ISLB600@976.1N/m has been used as a simply supported beam over a span of 7.2m. Determine the safe uniform load that the beam can carry in flexure if the compression flange of the beam is restrained against lateral buckling.	10	Sep 2020
<b>4</b>	Differentiate between web buckling & web crippling.	5	Sep 2020
<b>5</b>	Design a built-up column consisting of two channels placed back to back to carry an axial factored load of 1500 kN. Length of the column is 6m and the column is restrained in position but not in direction at both ends. Provide single lacing system with bolted connection.	13	Dec 2019
<b>6</b>	What are the main purpose of lacings and battens?	2	Dec 2019
<b>7</b>	Design a suitable slab base for a column section ISHB 200@365.9N/m supporting an axial load of 500 kN. The base plate is to rest on a concrete pedestal of M20 grade concrete. The load is transferred to the base plate by welded connection	10	Dec 2019
<b>8</b>	Design a built-up column consisting of two channels placed back to back to carry an axial factored load of 1900kN. Design bolted	15	Dec 2018

	single lacing system also. Length of the column is 10m and both the ends of the column are effectively restrained in direction and position		
9	Design a gusseted base for a column ISHB 350 @72.4 kg/m with flange plates 450 × 20mm carrying a factored axial force of 3000kN. The column rests on M20 grade concrete pedestal. Design the bolted connection also. Assume Fe 410 grade steel and 4.6 grade bolts.	10	Dec 2018
10	a)Design a column 10 m long to carry a factored axial load of 1100kN. The column is restrained in position but not in direction at both ends. Design a batten system for the column. Assume that the two channels are kept back to back. b) Explain the failure modes of axially loaded columns	15  5	May 2018

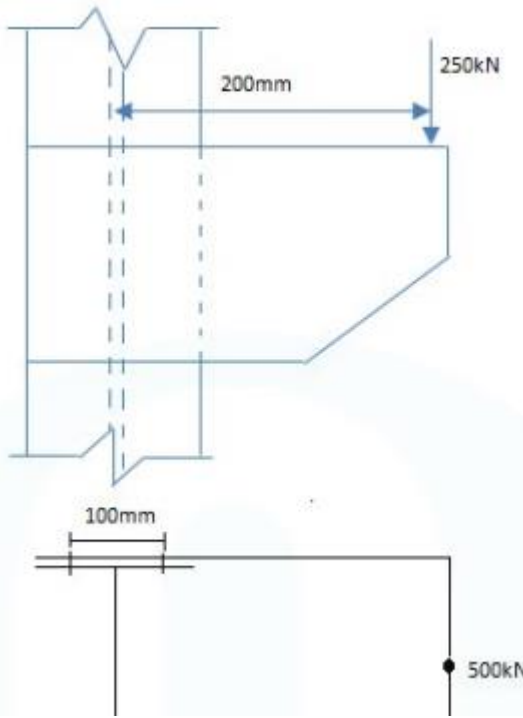
#### MODULE 4

1	Design a simply supported beam of 10m effective span carrying a total factored load of 60kN/m. The depth of beam should not exceed 500mm. The compression flange of beam is laterally supported by floor construction. Assume stiff end bearing is 75mm.	15	May 2019
2	What are the cross section classification defined in IS 800-2007 based on slenderness of plate elements?	3	May 2019
3	Distinguish between laterally restrained and unrestrained beams	3	Dec 2018
4	A conference hall 8mx12m 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 <sup>2</sup> and floor finish of 1.5 kN/m <sup>2</sup> . Design one of the beam as laterally supported.	11	Dec 2018
5	What is lateral torsional buckling of beams?	3	Dec 2018
6	Design the simply supported main beam of a building supporting concrete floor slab with the following data: Centre to centre distance of beams – 6m Span of beam – 7m Thickness of concrete	13	Dec 2018

	slab – 240mm Finished screed – 40mm thick Weight of concrete slab and finished screed- 24kN/m <sup>3</sup> Imposed load – 4kN/m <sup>2</sup>		
7	An ISLB600@976.1N/m has been used as a simply supported beam over a span of 7.2m. Determine the safe uniform load that the beam can carry in flexure if the compression flange of the beam is restrained against lateral buckling.	10	Dec 2019
8	Differentiate between web buckling & web crippling.	5	Dec 2019
9	Explain the classification of cross sections as per the IS 800: 2007 based on yield and plastic moments & rotational capacities	5	Dec 2019
10	Distinguish between laterally restrained and unrestrained beams	4	May 2019

### MODULE 5

1	A roof truss shed is to be built in Chennai for an industry .The size of shed is 20mx8m.The height of building is 10m at the eaves. Determine the basic wind pressure.	5	May 2018
2	A purlin is to be designed to support a GI sheet as roofing material for a truss spaced at 3.5m c/c. purlin along the principal rafters are arranged at a distance of 1.35mc/c. The pitch of truss is 0.2m. Design a section for the purlin. Assume basic wind speed as 44m/s.	15	May 2019
3	Design a fan type roof truss for a span of 9m, with 4m spacing, using GI sheets. Slope of rafter 30°. The wind pressure is 1.15kN/m <sup>2</sup>	20	Dec 2019
4	Determine the design forces in the members of a Fink type roof truss for an industrial building for the following data. Overall size of building : 48 x16m., C/c spacing of trusses: 8m , Rise of truss :1/4 of span , Self weight of purlins : 318 N/m., Height of columns : 11m. Roofing : A C sheets (171N/m <sup>2</sup> ), Location : Agra.	20	Dec 2020
5	Derive the expression for calculating the force F in a bolt subjected to a factored load P at an eccentricity e. The line of action of the load is in the plane of the bolted connection and the centre of gravity of the connection is the centre of rotation.	4	Dec 2018

6	<p>The trusses for a factory building are spaced at 6 m c/c. and the purlin is spaced at 2m c/c. The pitch of truss is 28° and span of truss is 18m. The roof consists of asbestos sheets with 150 N/m<sup>2</sup>.          .Design a suitable I section purlin</p>	16	
7	<p>Explain various loads and load combinations to be considered in the design of a roof truss.</p>	4	Dec 2020
8	<p>Design an I section purlin for an industrial building, located at Chennai, with Galvanised iron sheets as the roofing material. Span of the truss =13m Spacing of trusses = 6m c/c Spacing of purlins = 1.2m c/c Wind pressure intensity = 2 kN/m<sup>2</sup> Weight of GI sheets =130</p>	16	May 2019
9	<p>Design a bolted bracket connection (in plane) to support an end reaction of 500kN due to the factored loads supported by the beam, as shown in figure below. The eccentricity of the end reaction is 200 mm. The steel used is of grade Fe410 and bolts are of 20mm diameter, grade 4.6. The thickness of bracket plate may be taken as 10 mm. The column section is ISHB200 @366N/m.</p> 	15	Dec 2019

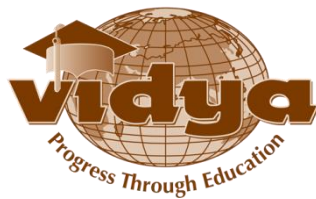
10	Explain various loads and load combinations to be considered in the design of a roof truss	4	Dec 2020
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**VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY  
TECHNICAL CAMPUS, KILIMANOOR**

**(A Unit of Vidya International Charitable Trust)**

*Accredited by NAAC with B++ Grade*



**MCN 401 INDUSTRIAL SAFETY AND ENGINEERING  
QUESTION BANK**

*(Common for all branches)*

<b>MODULE 1</b>			
<b>SL.NO</b>	<b>QUESTIONS</b>	<b>MARK</b>	
1	Differentiate Unsafe act and Unsafe conditions with suitable examples	3	MODEL
2	Discuss the significance of a safety committee in improving the safety performance of an industry	3	MODEL
3	List the various accident causation theories and explain any one in details.	14	MODEL
4	Discuss the significance of safety policy in reducing the accidents.	4	MODEL
5	Safety and productivity are the two sides of a coin'. Are you agreeing with this statement? Explain with your arguments.	10	MODEL
6	Discuss the role of management, supervisors, workmen, unions, government and voluntary agencies in safety.	14	MODEL
7	Write down the needs, types and advantages of safety committee?	14	MODEL
8	Write down the needs of safety in industries?	14	MODEL
9	Define the following terms a) Industrial safety b) Accident c) Injury d) Unsafe act e) Unsafe Condition f) Dangerous Occurrence g) Reportable accidents	(7*2=14)	MODEL
10	Write down the responsibilities of a safety officer?	3	MODEL
11	Which are the hazardous work which can expose the workers to have?	3	MODEL
12	The protection of workers from occupational accidents and diseases is the primarily the responsibility of management. Discuss the role of management to achieve this objective?	14	MODEL
<b>MODULE 2</b>			
1	Which are the different types of permit? Highlight its suitability	3	MODEL
2	Which are five 'S' used in housekeeping?	3	MODEL
3	Classify the personal protective equipment. List the suitability of at least fifteen types of PPEs.	10	MODEL
4	How will you calculate the frequency rate? Explain with an example.	4	MODEL
5	How will you compare the safety performance of two industries? Explain with suitable example	10	MODEL
6	Which are the steps to be followed in confined space entry to protect the life a worker.	4	MODEL
7	Write short notes on safety performance rate • Frequency rate	3	MODEL

	<ul style="list-style-type: none"> <li>• severity rate</li> <li>• incidence rate</li> <li>• activity rate</li> </ul>		
8	Firm A has 60 workers working 48 hours a week and 20 accidents (lost time) resulting in 120 man-days lost. Firm B has 80 workers working 48 hours a week and 30 accidents resulting in 150 man-days lost. Which firm has the better safety performance during the same six months?	14	MODEL
9	What are the industrial models used for in the workplace? Write the methodology for each.	14	MODEL
10	Explain any three types of maintenance and their effects on housekeeping	3	MODEL
11	Using the following data calculate the frequency rate of accident in an industrial plant. a) Number of workers=500 b) Number of disabling injuries per year= 5. c) Average number of hours worked by worker per year=2000.	14	MODEL
12	Discuss the types and hazards of a confined space?	3	MODEL
<b>MODULE 3</b>			
1	List the various safety features of ladders	3	MODEL
2	How safety of the workers can be ensured during a demolition operations.	3	MODEL
3	Discuss the safety and fire protection facilities required for a high rise building as per National building code.	14	MODEL
4	Identify the various hazards during the different stages of building construction.	7	MODEL
5	Discuss the important types of ergonomic hazards associated with industries.	7	MODEL
6	What are safety measures adopted in construction phase?	4	MODEL
7	What is the causes of ergonomics hazards in construction work?	7	MODEL
8	Explain the National Building Code of India	7	MODEL
9	Discuss the safety measures to be followed in blasting and demolition work	14	MODEL
10	What is the relevance of ergonomic construction safety?	7	MODEL
<b>MODULE 4</b>			
1	Which are the hazards associated with manual material handling?	3	MODEL
2	Discuss the safety issues of Gas welding operations.	3	MODEL
3	Which are the various types of machine guarding devices used industries. Discuss the suitability of each machine guarding devices.	14	MODEL

4	With suitable sketches briefly explain seven defects of wire ropes.	14	MODEL
5	What are the various types of Guards?	7	MODEL
6	Explain safety measures needed in turning and grinding.	14	MODEL
7	What are the various material handling equipment?	7	MODEL
8	Explain the safety needed in arc welding and gas welding.	14	MODEL
9	Explain Hearing Conservation Programme in Production industries.	7	MODEL
10	Discuss the safety issues in arc welding operations.	3	MODEL
<b>MODULE 5</b>			
1	Differentiate Hazard and Risk.	3	MODEL
2	Why MSDS is mandatory for chemical products.	3	MODEL
3	Define objectives of dow fire and explotion index	3	MODEL
4	Define material factor for calculation of Dow F & EI	5	MODEL
5	What are the different types of hazards.	10	MODEL
6	Define classes of fires	10	MODEL
7	What are the different types of chemical hazards	10	MODEL
8	What is Hazard and Operability Analysis? How do you conduct a HAZOP analysis?	14	MODEL
9	Define hazard identification methods	14	MODEL
10	Wahat are the risk assessment tools	14	MODEL
11	Discuss about different types of chemical hazards.	14	MODEL
12	What are the different types of fire extinguishers.	14	MODEL

## EET. 435 RENEWABLE ENERGY SYSTEMS

### MODULE I

Sl.No	Questions	Mark	
1	Compare different types of solar cells with reference to their construction and efficiency.	5	KTU April 18
2 a	Elaborate the availability and limitations of conventional sources of energy and its impact on human life. What are the alternate solutions	5	KTU April 18
b	Explain the non-conventional energy resources available in Indian energy scenario.	5	KTU April 18
3	List the merits and de-merits of non-conventional energy resources	5	
4	Compare conventional and non-conventional sources of energy	4	KTU Dec 20 18
5	Elaborate the availability and limitations of conventional sources of energy and its impact on human life. What are the alternate solutions?	5	KTU April 2018
6	What are energy resources? How are they classified?	5	KTU May 2019
7	What are the advantages and disadvantages of conventional energy resources?	2	KTU May 2019
8	Explain the principle of conversion of solar radiation into heat	5	KTU Dec 2018
9	Differentiate between flat plate collectors and solar concentrators and compare their performance based on concentration ratio, collector efficiency and temperature range.	6	KTU Dec 2018
10	What is the principle of conversion of solar energy into heat? What are solar thermal collectors? What are the characteristic features of a collector system	7	KTU May 2019
11	What are concentrating collectors? What is the need for orientation in concentrating collectors? Explain briefly the various types of concentrating collectors.	5	KTU May 2019

12	Draw and explain the operation of flat plate collectors	5	KTU Dec 2019
13a	With the aid of a neat diagram, explain the working of a central tower collector type solar thermal electric plant	9	Model question
b	Define (i) Open Circuit Voltage (ii) Short circuit Current (iii) Fill factor and (iv) Efficiency of the solar cell	5	Model question
14a	Compare the components and working of a standalone and grid connected PV system	5	Model question
b	How energy resources are classified. Compare conventional and non conventional sources of energy resources	9	Model question
15	Classify solar cell based on the type of material used. Explain each one. Draw and explain the block diagram of a standalone solar PV power system.	10	KTU Dec 2017
16	Explain stand-alone and grid connected solar PV systems? Explain each type with the help of block diagram and bring out their relative merits.	10	KTU April 2018
17	Draw the V-I characteristics of a solar cell and list out the factors affecting the electricity produced by a solar cell? Compare different types of solar cells with reference to their construction and efficiency.	10	KTU April 2018
18	For a solar PV installation it is necessary to measure the global solar irradiance of the site. Suggest a suitable solar measuring instrument and explain its working.	5	KTU April 2018
19	Draw the block diagram of a solar thermal electric plant and explain its working.	6	KTU Dec 2018
20	Explain stand-alone PV system with necessary diagram.	4	KTU Dec 2019
21	With a neat diagram explain the Grid connected PV systems	4	KTU Sep 2020
22	With a neat diagram explain solar cell characteristics	4	KTU Sep 2020

## MODULE II

Sl.No	Questions	Mark	
1	With the help of a block diagram explain the working of a hybrid OTEC.	3	Model Question, KTU Sep 2020
2	List out the advantages and disadvantages of a tidal power plant.	3	Model Question, KTU Sep 2020
3	What are the site selection criteria for OTEC? Draw the block diagram and explain the working of Anderson cycle based OTEC system. Explain how biofouling affects efficiency of energy conversion and how can it be minimised?	14	Model Question, KTU April 18
4	Explain the principle of operation of a tidal power plant. How it is classified? Draw the layout of a double basin tidal power plant and label all the components. Explain the function of each component	14	Model Question, KTU April 18
5	Explain the principle of tidal power generation.	3	KTU Dec 18
6	Compare the working of an open cycle, closed cycle and hybrid cycle OTEC plants with neat sketches.	6	KTU Dec 18
7	Differentiate between ebb generation and flood generation in tidal plants	5	KTU Dec 18
8	Explain the site-selection criteria for OTEC plants	3	KTU Sep 2020
9a	Describe a hybrid cycle OTEC system.	6	KTUMay 2019
b	What is biofouling? How can it be prevented?	4	KTUMay 2019
10	How are tidal power plants classified? With neat diagrams, explain the working of each.	8	KTUMay 2019
11	Differentiate between Closed cycle and Anderson cycle OTEC.	5	KTU Dec 2019
12	Classify tidal power plants and brief explain any two of them.	6	KTU Dec 2019
13	What is meant by “bio fouling” and what is effect on OTEC. What are the methods used avoid this problem.	4	KTU Dec 2019
14	Classify tidal power plants based on the type of basin used.	6	KTU Sep 2020

15	List out any five merits and demerits of OTEC. Explain various types of tidal power plants.	10	KTU Dec 2017
16	State the merits and limitation of ocean energy conversion plant. Drawing a schematic diagram, explain the principle of a closed cycle OTEC Plant. Why closed cycle OTEC is preferred?	10	KTU Dec 2017
17	Explain the principle of tidal power generation. List the advantages and limitations of tidal power plant	9	KTU Dec 2018

### MODULE III

1	Discuss the different types of wind turbine rotors used to extract wind power.	3	Model Question
2	The Danish offshore wind farm has a name plate capacity of 209.3 MW. As of January 2017, it has produced 6416 GWh since its commissioning 7.3 years ago. Determine the capacity factor of above wind farm.	3	Model Question
3a	Prove that the maximum wind turbine output can be achieved when $V_d = 1/3 V_u$ , where $V_d$ and $V_u$ are down-stream and up-stream wind velocity respectively	10	Model Question, KTU Dec 17
b	What is pitch control of wind turbine? Explain	4	Model Question, KTU Dec 17b
4a	Determine the power output of a wind turbine whose blades are 12m in diameter and when the wind speed is 6m/s, the air density is about $1.2 \text{ kg/m}^3$ and the maximum power coefficient of the wind turbine is 0.35.	5	Model Question, KTU Dec 17
b	Explain the parts, their function and working of a wind power plant. What are the site selection criteria of a wind power plant?	9	Model Question
5	Discuss the different types of wind turbine rotors used to extract wind.	5	KTU Dec 17
6	Explain the terms solidity, pitch angle, tip speed ratio, cut-in speed and cut speed of wind turbine	5	KTU Dec 17
7	Derive the expression for power in the wind turbine. Define the	5	KTU April 18



	term capacity factor of wind power plant.		
8	Explain the lift and drag forces in wind and its importance in wind power generation.	5	KTU April 18
9a	Give the site selection criteria for wind plants and write a note on wind energy potential in India	5	KTU April 18
b	Draw the block diagram of a typical wind energy conversion system and explain the working of wind power plant.	5	KTU April 18
10	Explain how wind power plants are classified. Explain vertical axis wind turbine with necessary diagrams.	5	KTU April 18
11	Discuss the factors affecting the wind speed at an area.	5	KTU Dec 18
12	List the advantages and disadvantages of wind energy conversion system.	5	KTU Dec 18
13	What are the two fundamental mechanisms to produce force from the wind? What are the advantages and disadvantages of a wind energy conversion system?	5	KTU May 19
14	The following data relate to a wind turbine: Velocity of wind at 150C= 10 m/s Turbine diameter=10m Operating speed of the machine=35 rpm at maximum efficiency of 40% Calculate: i) total power density in the wind stream ii) The maximum power density iii) The actual power density iv) Power output of the turbine	6	KTU May 19
15	What are the two fundamental mechanisms to produce force from the wind? What are the advantages and disadvantages of a wind energy conversion system?	5	KTU May 19
16	Give a comparison between vertical axis and horizontal axis wind machines	5	KTU May 19
17	Explain yaw control mechanism	4	KTU Sep 20
18	With a neat diagram explain the construction of a propeller type wind power system	6	KTU Sep 20

## MODULE IV

1	What are the factors that affect biogas generation	3	Model question
2	Discuss the process of biomass to ethanol conversion	3	Model question
3a	With a neat schematic diagram , explain the biomass gasification based electric power generation system	5	Modelquestion, KTU Dec 17
b	Explain the how urban waste is converted into useful energy	9	Model question
4a	Compare the construction and performance of floating drum type and fixed dome type biogas plants with the help of neat sketches	10	Model question
b	Explain the importance of biomass programme in India	4	Model question
5	With a neat diagram, explain the working of biogas plant	5	KTU Dec 17
6	Explain any two types of biogas plants? Discuss the factors which decide the quality of biogas.	5	KTU Dec 17
7a	Explain the how urban waste is converted into useful energy.	5	KTU, April 18
b	Explain the process of anaerobic digestion of biomass into biogas. Draw the schematic diagram of a biodigester.	5	KTU, April 18
8	Draw the schematic of a KVIC type of bio gas plant	5	KTU Dec 18
9	Explain the production of ethanol from biomass for fuel applications.	4	KTU Dec 18
10	Write brief notes on any three types of gasifiers used for biomass to fuel conversion.	6	KTU Dec 18
11	What is anaerobic digestion? Explain briefly	5	KTU, May 19
12	What are biomass resources? Enumerate the processes which are used for biomass conversion	10	KTU, May 19
13	What are the factors that affect biogas generation	5	KTU, Sep20
14	With a neat schematic diagram, explain the biomass gasification based electric power generation system.	5	KTU Dec 17
15	Draw the schematic of a KVIC type of bio gas plant. Briefly explain the power generation from satellites.	10	Ktu Dec18
16	Explain the production of producer gas from biomass.	5	KTU, Dec 19
17	What is anaerobic digestion? Explain briefly	5	KTU, May 19

## MODULE V

1	What are the components of micro hydel power plant.	3	Model question
2	Enumerate the design and selection of different types of turbines used for small hydro plants	3	Model question
3a	Explain the operation of a phosphoric acid fuel cell with the help of a suitable diagram	7	Model question
b	What are the different methods used for the production and storage of hydrogen	7	Model question
4a	Draw the layout of a mini hydro project and explain its working	7	Model question
b	Describe the working and constructional features of PEM fuel cell	7	Model question
5	What are the components of a micro hydel power plant	5	KTU Dec 17
6	Describe the working and constructional features of PEM fuel cell.	5	KTU Dec 17
7	Explain the design and selection of different types of turbines used for small hydro plants.	5	KTU April 18
8	Explain how fuel cell works as a renewable energy source.	5	KTU April 18
9	Describe how energy is harnessed from satellite stations	5	KTU April 18
10	Draw the layout of a micro hydro project.	4	KTU Dec 18
11	Explain any one type of fuel cell.	5	KTU Dec 18
12	Prepare a brief note on emerging technologies in the field of renewable energy.	4	KTU May 19
13	What is small hydro power? How is it classified? Obtain an expression for the power that can be generated from a small hydro power station.	5	KTU May 19
14	What are fuel cells? Mention few applications of fuel cells.	5	KTU May 19
15	Explain the working principle of a fuel cell.	4	KTU Sep 20
16	Briefly explain the hydrogen energy system with necessary diagram	5	KTU Dec 2019
17	What is meant by small hydro project? Give its classifications.	5	KTU Dec 2019
18	Briefly describe about Fuel Cell Technology, Hydrogen Energy, Alcohol energy and Power from Satellite stations	10	KTU April 18
19	Describe how energy is harnessed from satellite stations. Explain the how urban waste is converted into useful energy.	10	KTU April 18

**CET 463: ADVANCED ENVIRONMENTAL ENGINEERING****MODULE -1**

Sl. No.	Question	Marks	Year
1	Explain denitrification	3	KTU Model Qn Paper
2	What are the sequences of operation in an SBR?	3	KTU Model Qn Paper
3	Explain the process for biological nitrogen removal	9	KTU Model Qn Paper
4	How anoxic process is different from anaerobic process	5	KTU Model Qn Paper
5	Explain the working of an SBR	6	KTU Model Qn Paper
6	Explain the treatment technologies available for phosphorous removal in waste water	8	KTU Model Qn Paper

**MODULE -2**

1	How advanced oxidation processes (AOP) helps in treating waste water?	3	KTU Model Qn Paper
2	What is the difference in the biological process of an RBC and MBBR?	3	KTU Model Qn Paper
3	Explain the working principle of an MBBR	6	KTU Model Qn Paper
4	Discuss Advanced Oxidation Processes	8	KTU Model Qn Paper
5	How aerobic attached process compare with aerobic suspended process	5	KTU Model Qn Paper
6	What is the application of Wet Air Oxidation process	5	KTU Model Qn Paper
7	How biological process in RBC is different from that in MBBR	4	KTU Model Qn Paper

**MODULE -3**

1	What are adsorption isotherms?	3	KTU Model Qn Paper
2	How ion exchange can soften water?	3	KTU Model Qn Paper
3	List some popular adsorbents. How they are regenerated after use?	4	KTU Model Qn Paper
4	Explain breakthrough curve in continuous adsorption process.	5	KTU Model Qn Paper
5	What are the applications of ion exchange process in water treatment?	5	KTU Model Qn Paper
6	Explain the significance of adsorption processes in environmental engineering	7	KTU Model Qn Paper
7	Explain various adsorption kinetics models	7	KTU Model Qn Paper

**MODULE -4**

1	What is Ultra filtration?	3	KTU Model Qn Paper
2	Explain the benefits of MBR treatment system.	3	KTU Model Qn Paper
3	Explain the working principle of Electro Dialysis	6	KTU Model Qn Paper
4	Calculate the maximum efficiency for a RO plant, which is operated with a inlet pressure of 45 bar and under the condition that effective driving force $\Delta p_{eff} \min = 15$ bar is maintained. The permeate pressure is 1 bar, pressure loss is 3 bar and mass fraction of salt in permeate ( $W_p$ ) = 0. Feed is a NaCl solution with mass fraction ( $W_f$ ) = 0.03 and the osmotic coefficient is 790 bar. How big is the membrane area if $10 \text{ m}^3/\text{h}$ of permeate are to be produced and a membrane with $A = 1.2 \cdot 10^{-7} \text{ m}/(\text{s} \cdot \text{bar})$ was chosen?	8	KTU Model Qn Paper
5	Explain the working of Membrane Bio Reactors. What are the different configurations available for MBRs?	6	KTU Model Qn Paper

6	A design wastewater flow 7571 m <sup>3</sup> /d is to be treated with an MBR treatment system. The design membrane module properties are, average membrane flux= 12 L/hr/m <sup>2</sup> ; module packing density= 120m <sup>2</sup> /m <sup>3</sup> ; specific aeration demand= 0.3 m <sup>3</sup> air/hr/m <sup>2</sup> membrane area. Calculate the required membrane area, membrane module volume and scouring air flow rate.	8	KTU Model Qn Paper
<b>MODULE -5</b>			
1	How cyclones remove particles from a gas stream	3	KTU Model Qn Paper
2	what is desulfurization	3	KTU Model Qn Paper
3	Wet scrubbing is useful for the removal of both particulate and gaseous pollutants. Explain	6	KTU Model Qn Paper
4	As an air pollution control engineer, explain what air pollution control measures you will adopt at a Coal fired thermal power plant and why?	8	KTU Model Qn Paper
5	Discuss the source reduction measures for oxides of nitrogen	6	KTU Model Qn Paper
6	Explain the principle of electrostatic precipitator. Discuss the advantages and limitations of electrostatic precipitators.	8	KTU Model Qn Paper

**ELECTIVE: CET 423 GROUND IMPROVEMENT  
TECHNIQUES (QUESTION BANK)**

**Module – 1**

<b>Sl.No.</b>	<b>Question</b>	<b>Marks</b>	<b>Question Paper</b>
1.	What are the factors that should be considered in the selection of the best ground improvement technique?	5	KTU Dec 2018 (2015 Scheme)
2.	Classify the major soil deposits in India based on different climatic conditions and amount of rainfall.	8	KTU DEC 2019 (2015 Scheme)
3.	Explain the importance of Ground improvement in foundation engineering.	8	KTU DEC 2019 (2019 Scheme)
	Name any five-material used for ground improvement	6	
4.	What is reclaimed soil? Explain the different types of reclamation materials.	5	KTU April 2018 (2015 Scheme)
	Give notes on different types of ground improvement techniques	5	
5.	Which are the various approaches incorporated in association with ground improvement potential? Identify the various ground/soil conditions on the basis of these approaches.	9	
6.	Explain the importance of Ground improvement in foundation engineering.	3	
7.	Name any five-material used for ground improvement.	3	
8.	a) Categories different ground improvement methods based on the soil suitability	7	
	b) Explain the property of material suitable for ground improvement	7	
9.	List the different method of insitu ground improvement techniques and its applications	10	
10.	Explain the properties of material used for ground improvement	4	

## Module – 2

<b>Module – 2</b>			
1.	Write note on Column techniques for Ground improvement.	15	KTU DEC 2019 (2015 Scheme)
2.	Explain the procedure for the construction of soil nail. Also mention the various materials used for soil nailing	8	KTU DEC 2019 (2015 Scheme)
3.	With neat sketches, explain vibro-compaction method.	7	KTU APR 2018 (2015 Scheme)
4.	Explain the Dynamic Compaction for Ground improvement.	10	KTU APR 2018 (2015 Scheme)
5.	Explain about the compaction control	4	KTU APR 2018 (2015 Scheme)
6.	Explain the blasting method used for Ground improvement.	3	
7.	Write note on Column techniques for Ground improvement.	3	
8.	Outline how the ground improvement are achieved by vibration techniques.	7	
9.	What is Stone column? Explain its method of construction	7	



### Module – 3

Module – 3			
1.	How Electro osmotic method is applied for Ground Improvement.	3	KTU DEC 2019 (2015 Scheme)
2.	Write note on the importance of lowering the ground water in a construction site.	3	KTU DEC 2019 (2015 Scheme)
3.	Explain the application of vertical drain.	7	KTUDEC 2019 (2015 Scheme)
4.	What is PVD? Explain its advantage over other drains	7	KTU MAY 2019 (2015 Scheme)
5.	Illustrate the well point system of dewatering.	7	KTU APR 2018 (2015 Scheme)
6.	Explain about different drains facility	7	
7.	Explain well point system of dewatering for ground improvement.	7	
8.	What is vacuum dewatering method? Explain.	6	
9.	Explain the dewatering method using open sump and ditches.	7	

### **Module – 4**

<b>Module – 4</b>			
1.	What are the different earth reinforcement materials. Explain the construction procedure of reinforced earth wall	10	KTU DEC 2019 (2015 Scheme)
2.	Explain the procedure for the construction of soil nail. Also mention the various materials used for soil nailing	8	KTU DEC 2019 (2015 Scheme)
3.	Illustrate the application of geo-textile as (a) Filtration (b) Drainage (c) Erosion control	10	KTU MAY 2019 (2015 Scheme)
4.	Explain the design considerations of a) Reinforced Earth wall (b) Soil nailing	10	KTU MAY 2019 (2015 Scheme)
5.	Write short note on soil nailing.	8	KTU MAY 2019 (2015 Scheme)
6.	Outline the use of micro pile as ground improvement choice.	3	
7.	List different type of geosynthetics	3	

### Module – 5

<b>Module – 5</b>			
1.	Discuss the advantages and disadvantages of compaction grouting.	5	KTU DEC 2019 (2015 Scheme)
2.	What is the principle behind the technique of grouting? According to Koerner, which are the basic functions of soil and rock grouting?	5	KTU DEC 2019 (2015 Scheme)
3.	Discuss the advantages and disadvantages of compaction grouting	5	KTU DEC 2019 (2015 Scheme)
4.	What are the applications of grouting? Describe with the help of neat diagrams.	10	KTU MAY 2019 (2015 Scheme)
	Mention any four basic types of lime. How is lime stabilized base constructed?	7	KTU DEC 2019 (2015 Scheme)
5.	(a) Explain Grouting technique used for Ground Improvement. (b) Explain the principle of ground freezing	10 4	
6.	Describe the chemical aspects of lime stabilisation and its effects on adjacent soil	14	
7.	List the different type of grouting material used for ground improvement?	3	
8.	Explain method of stabilisation using cement	3	

