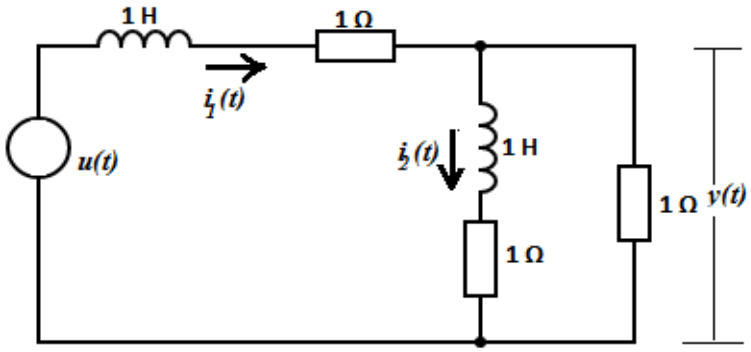
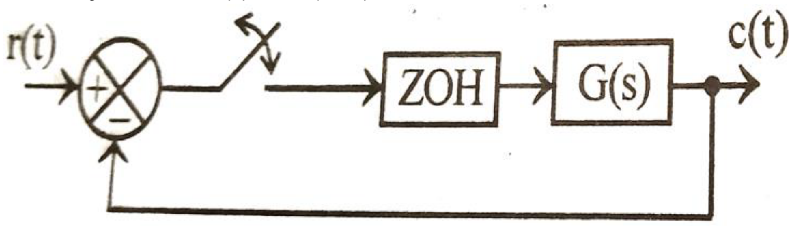
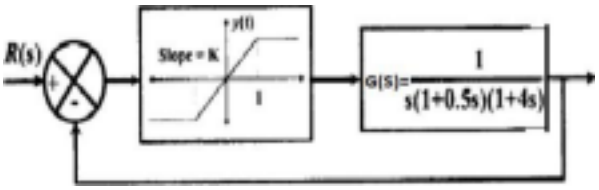
QUESTION BANK

Subject: EET 401 Advanced Control Theory

S7 EEE

Sl.no	Question	Marks	Year
	MODULE 1		
1	Selecting $i_1(t) = x_1(t)$ and $i_2(t) = x_2(t)$ as sate variables obtain state equation and output equation of the network shown in Fig.1 	5	KTU APRIL 2018
2	Transform the system in to controllable canonical form $\dot{x} = [0\ 1\ \ -2\ \ -3\ ]x + [2\ 1\ ]u$ and $y = [1\ 2\ ]x$	5	KTU APRIL 2018
3	Find the complete response of the system $\dot{x} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} x + \begin{bmatrix} 2 & 1 \\ 0 & 1 \end{bmatrix} U(t), x(0) = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ and $y(t) = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} x$ to the following input, $U(t) = \begin{bmatrix} u(t) \\ e^{3t}u(t) \end{bmatrix}$ where $u(t)$ is the unit step input.	10	KTU APRIL 2018
4	Explain the terms (i) state (ii) state variables (iii) state vector (iv) state space.	5	KTU MAY 2019
5	Derive the state model of the following transfer function in, (i) Controllable canonical form (ii) Diagonal canonical form $\frac{y(s)}{u(s)} = \frac{5(s+2)}{s(s+1)(s+2)}$	10	KTU DEC 2019

7	(A). Obtain the state model of the system whose transfer function is given by $Y(s)/U(s)= 10/[s^3+4s^2+2s+1]$ (B). Obtain the state model of a field controlled DC motor.	5 5	KTU SEPT 2020
MODULE 2			
1	Determine the pulse transfer function of the discrete time control system shown in figure for a sampling time of T=1 sec. Also find the response to unit step input. The transfer function of the system is G(s) = 1/(s+1). 	10	KTU MAY 2019
2	Derive a relation between state equation and transfer function for LTI system.	5	KTU DEC 2019
3	What is pulse transfer function?	1	KTU SEPT 2020
4	A discrete time system is described by the difference equation $y(k+2)+5y(k+1)+6y(k)=u(k)$ $y(0)=y(1)=0$; $T=1$ sec. (a) Determine state model in a canonical form (b) Find the state transition matrix	10	KTU SEPT 2020
MODULE 3			
1	Define controllability and observability of a system and check whether the system $Y(s)/U(s) = 1/(s+1)(s+2)$ is controllable or not.	6	KTU MAY 2019
2	Consider a linear system described by the transfer function Y(s)/U(s) =10/[S(S+1)(S+2)]. Design a feedback controller with a state feedback so that the closed loop poles are placed at -2, -1±j1.	7	KTU MAY 2019
3	Define controllability. Explain with a suitable example, how can we check the controllability of a system.	5	KTU Decembe r 2019
MODULE 4			
1	Consider a unity feedback system shown in figure having a saturating amplifier with a gain K. Determine the	10	KTU May

	maximum value of K for the system to be stable. What would be the frequency and nature of limit cycle for a gain of K=2.5? 		2019
2	Derive the Describing function of saturation with Dead-zone nonlinearity.	10	KTU May 2019
3	Write the concept of describing function method	5	KU May 2012
4	Define Describing function. Explain how describing function can be used for stability analysis of nonlinear systems.	5	KTU May 2019
5	Explain different non linearities with diagram.	5	KTU April 2018
6	Explain saturation and dead zone nonlinearities associated with non linear system	6	KU May 2012
	MODULE 5		
1	Explain Liapunov second method of stability for nonlinear systems.	5	KTU May 2019
2	What is phase plane analysis? How is it used for analysis non linear systems	5	KU May 2012
3	Determine whether the following function is positive definite or not $Q=X1^2+2X2^2+3X3^2+2X1X2^2+20X1X3$	5	KU May 2011
4	Define Singular point. Explain the nature of Eigen values of system matrix for any five types of singular points.	5	KTU May 2019
5	Determine given quadratic form is positive definite or not $V(x) = 10x_1^2 + 4x_2^2 + x_3^2 + 2x_1x_2 - 2x_2x_3 - 4x_1x_3$	5	KTU April 2018
6	What is limit cycle? How will you determine stable and unstable limit cycle using phase portrait?	5	KTU April 2018

Illumination Technology (EET 463) S7EEE

Sl No.	Question	Marks	YEAR
	Module 1		
1	What are the requirements of a good artificial lighting scheme?	5	KTU April 2018
2	Explain with a neat diagram the different types of artificial lighting system used. Clearly show the amount of light thrown to up and down direction. Also specify the areas where they are commonly used.	10	KTU April 2018, KTU May 2020
3	What is disability and discomfort glare? Explain on VCP and UGR in connection with glare rating.	5	KTU April 2018
4	Mention the various types of luminaries used for proper lighting scheme.	5	KTU Dec 2018
5	What are the different types of glare?	5	KTU May 2017
6	How glare can be eliminated in artificial lighting?	6	KTU May 2017,KTU May 2020
7	Explain Colour rendering and Stroboscopic effect	5	KTU May 2020

9	What are the factors affecting the quality of artificial lighting?	5	KTU May 2019,KTU May 2020
10	What is a glare? How it is classified.	3	KTU May 2019
11	What are the different lighting schemes employed in interior lighting? Clearly state the percentage of light flux in different directions.	7	KTU May 2019

12	What is the effect of stroboscopic effect on visual comfort in an artificial lighting scheme? How the effect can be reduced	4	KTU May 2019

	Module 2		
1	Illustrate with a neat diagram the concept of polar curve in illumination technology	5	KTU April 2018
2	Explain how is photometric bench is used for measuring candle power of a test lamp.	5	KTU April 2018
3	Define Inverse square law in illumination.	5	KTU April 2018,KTU May 2020
4	With the help of a neat diagram explain the working of a standard radiator used as a primary standard for measuring one Candela.	6	KTU April 2018

5	Define MHCP, MSCP?	5	KTU April 2018, KTU May 2020
6	A certain incandescent lamp, hangs from the ceiling of a room. The illuminance received on a small horizontal screen lying on a bench 2m vertically below the lamp is 63.5 lux. Calculate illuminance at a point when the screen is moved horizontally a distance of 1.5m along the bench.	5	KTU Dec 2018
7	Derive the expression for illumination in the case of a round source. Rousseans construction.	10	KTU May 2020
8	Define (i) Luminous Flux (ii) Luminous Intensity (iii) Illumination (iv) Brightness	6	KTU May 2016
9	With the help of appropriate sketches, explain polar luminance distribution curve	5	KTU May 2019
10	Explain how illumination can be calculated for Line source and Surface source.	4	KTU May 2019
11	Explain the terms Mean Spherical Candle Power (MSCP) and Mean Hemispherical Candle Power (MHCP).	2	KTU May 2019
12	Explain the term luminous efficacy? How the luminous efficacy of artificial light sources affect the operational cost of a lighting system?	2	KTU May 2019

13	Explain inverse square law and Lamberts cosine law with the help of neat sketches	4	KTU May 2019

14	Four lamps 15m apart are arranged to illuminate a corridor. Each lamp is mounted at a height of 8m above the floor level. Each lamp gives 450 Cd in all directions below the horizontal. Find the illumination at the point 'P' midway between second and third lamp.	7	KTU May 2019

	Module 3		
1	Specify the need of DLOR and ULOR in artificial architectural lighting. List out three factor on which DLOR and ULOR depends.	5	KTU April 2018
2	An office 30m X 15m is illuminated by twin 40w fluorescent luminaries of lumen output 5600 lumens. The lamps being mounted at a height of 3m from the work plane, the average illumination required is 240lux. Calculate the number of lamps required to be fitted in the office, assuming the CU 0.6 and maintenance factor to be 0.8. Assume the height of ceiling as 4.5m	10	KTU Dec 2018,KTU May 2020
3	The Kinfra apparel park provides space area of 40 m long, 20 m wide and 8 m in height to a textile company. The luminaires are suspended 1.5 m below ceiling level. The sewing machines are placed 1 m high from the floor level. Calculate the minimum number of luminaires which must be installed to conform a recommend SHR (Space height ratio) of 1.5 : 1. Clearly show the layout of the luminaires.	10	KTU April 2018,KTU May 2017

4	What are the special features that must be taken care of while illuminating staircase and entrance way?	4	KTU April 2018

5	With a neat diagram give the application of i) soffit fixtures ii) Recessed fixtures iii) Track fixtures and iv) Pendants	6	KTU April 2018
6	What are the different features of corridor lighting?	5	
7	What are the factors affecting Coefficient of utilization, UF and MF	10	KTU May 2020
8	Design illumination for a domestic building with the following details. Bed room – 3mx3m (2no.s), Living Room 4mx3m, Kitchen 3mx2.5m, dining 3mx3m, store 2mx1.5m, stair area 1.5mx1.5m, Verandha 1mx1.5m. Assume coefficient of utilization and maintenance factor as0 .8 &0.6 respectively	10	KTU May 2017
9	What are the desirable features of a luminaires?	5	KTU May 2019,KTU May 2017
10	What is ULOR and DLOR? How these parameters aid in selecting luminaries for different applications.	4	KTU May 2019
11	Calculate the room index for a hall of dimensions 10m X 8m X 3m. Luminaries are suspended at height of 0.8m from the ceiling and work plane height is 0.85 from floor.	2	KTU May 2019
12	Define 1. Coefficient of utilisation 2. Depreciation factor	2	KTU May 2019

13	A room 8m x12m is lighted by 15 lamps to a fairly uniform illumination of 100 lm/m2. Calculate the utilisation factor of the room, given that the output of each lamp is 1600 lumens.	4	KTU May 2019

Module 4			
1	What are the main factors to be considered while designing street/ road lighting?	6	KTU May 2018,KTU May 2020
2	Calculate the average illuminance on a road having 30 m width and having street light span of 30 m. The luminary used is a sodium vapour lamp luminaire and is arranged in single side layout. The total light output of the luminaire is 5000 lumens. The utilisation factor is 0.8 and the multiplication factor is 0.75.	5	KTU April 2018

3	A road of 300m long is required to be illuminated by providing 40 W fluorescent tube. The width of the road is 4m. Design a street lighting scheme as per BIS standard. Average illumination required is 0.6 lux.	10	KTU 2016
4	As per the Indian standard recommendation and standard practices can you explain the illumination levels in various areas	7	KTU 2016
5	Explain the various arrangements in street lighting	7	KTU May 2017,KTU May 2020
6	What are the different types of street and their illumination required as per BIS standard.	5	KTU May 2017

7	What are the different lighting schemes used for street lighting? Explain with appropriate sketches.	5	KTU May 2019
8	What are the advantages and disadvantages of using LED light as street light?	4	KTU May 2019
9	Define up cast angle, outreach, pole set back and mounting height in street lighting. Give a clear picture showing all these.	4	KTU May 2019
10	Explain the different types of fixtures used in street lighting.	4	KTU May 2019
11	An assembly line space has an area of 40 m long, 20 m wide and 8 m in height. The luminaires are suspended 1.5 m below the ceiling level. The work table are placed 1 m high from the floor level. Calculate the minimum number of luminaires which must be installed to conform a recommended SHRmax (Space.height ratio) of 1.5. Show the layout of the luminaires. Also calculate the average illuminanace achieved with the minimum number of luminaires with each luminaire fitted with 4 numbers of fluorescent lamps with an initial lamp flux of 1350 lumen. Assume MF=0.77 and UF= 0.75	3	KTU May 2019

12	What you do mean by flood lighting? List out the requirements of a good flood lighting scheme used for a football stadium.	5	KTU April 2018,KTU May 2020

13	LED lit luminaires are encouraged by the supply provider for various good reasons. What are the design modifications needed when LED luminaires are used for outdoor flood lighting purpose?	5	KTU April 2018
14	What are different methods available for aiming the lamp in flood lighting?	10	KTU April 2018

15	Explain the various design parameters taken into consideration while designing street lighting and flood lighting.	6	KTU Dec 2018
16	A parking area measuring 135m in length and 90 m in width is to be provided with area lighting. The specifications given are Illumination required = 10 lux Mounting height restriction = 10 m Lamps per pole = 2	10	KTU May 2017,KTU May 2020

Details	HPSV	LPSV
CU	0.60	0.55
LLF	0.75	0.9

The available lamp details are

Determine the layout of the lighting scheme with the wattage of lamps required

18	A building frontage 50m x 25m is to be illuminated by flood lighting projectors situated 25m away. If the illumination is 50 lux, coefficient of utilisation is 0.5, depreciation factor 1.5, waste light factor 1.2. Estimate the number and size of projectors. Sketch the projectors recommended indicating the adjustments provided.	10	KTU May 2019
19	What are the different methods available for aiming of lamp in flood lighting?	5	KTU May 2019

	Module 5		
1	List out the design consideration while illuminating a sports area such as a tennis court.	5	KTU April 2018,KTU May 2020

2	What are different types of emergency lighting used in a hospital?	5	KTU April 2018,KTU May 2020
3	During the Onam week celebration organised by the Dept. of Tourism, it is a customary to illuminate the Kerala Secretariat Building and the arterial road in the capital city in different colours. As an illumination engineer what are the different factors which must be considered for i) Illuminating the Secretariat building ii) The roads way aesthetic lighting iii) A Statue in front of Secretariat building	10	KTU April 2018
4	List out and explain at least five features of auditorium lighting.	10	KTU April 2018
5	What are the properties of Aesthetic lighting?	5	KTU May 2017
6	List out the design consideration while illuminating a sports area such as a Swimming pool.	10	KTU May 2016
8	Design an auditorium lighting scheme.	10	KTU May 2020

9	What are factors to be considered while selecting luminaries for different areas in hospitals?	5	KTU May 2020
10	Explain the design criteria for stadium lighting.	5	KTU May 2019
11	What are different factors to be considered while designing aesthetic illumination of bridges and statues?	5	KTU May 2019,KTU May 2020

12	What is the importance of modelling and shadows in the case of sports field lighting?	5	KTU May 2019,KTU May 2020
13	The boundary of a football stadium is 100m x 50m. The recommended illumination level is 500 lux. Luminaries of 1000W with light output of 92000 lumens are used for installation. Calculate the number of luminaries required to get the recommended level of illumination. Assume utilisation factor = 0.8, maintenance factor = 0.8, light loss factor = 1.2. Sketch the configuration of light fittings.	5	KTU May 2019

QUESTION BANK

MCN401- INDUSTRIAL SAFETY ENGINEERING

Sl No:	Questions	Marks	Year
	Module - 1		
1.	Differentiate Unsafe act and Unsafe conditions with suitable examples	3	Model Question Paper
2.	Discuss the significance of a safety committee in improving the safety performance of an industry	3	Model Question Paper
3.	List the various accident causation theories and explain any one in details.	14	Model Question Paper
4.	Discuss the significance of safety policy in reducing the accidents.	4	Model Question Paper
5.	Safety and productivity are the two sides of a coin'. Are you agreeing with this statement? Explain with your arguments.	10	Model Question Paper
6.	Explain the safety policy of the company	6	Visvesvaraya Technological University (VTU)
7.	Define (i) Accident (ii) Safety (iii) Hazard	6	Visvesvaraya Technological University (VTU)
8.	Explain the responsibilities of safety officer in an organization	8	Visvesvaraya Technological University (VTU)
	Module - 2		
9.	Which are the different types of permit? Highlight its suitability.	3	Model Question Paper
10.	Which are five 'S' used in housekeeping?	3	Model Question Paper
11.	Classify the personal protective equipment. List the suitability of at least fifteen types of PPEs.	10	Model Question Paper
12.	How will you calculate the frequency rate? Explain with an example.	4	Model Question Paper

13.	How will you compare the safety performance of two industries? Explain with suitable example.	10	Model Question Paper
14.	Which are the steps to be followed in confined space entry to protect the life a worker.	4	Model Question Paper
15.	Identify the general Personal Protective Equipment and explain any three	8	Visvesvaraya Technological University (VTU)
Module - 3			
16.	List the various safety features of ladders	3	Model Question Paper
17.	How safety of the workers can be ensured during a demolition operations.	3	Model Question Paper
18.	Discuss the safety and fire protection facilities required for a high rise building as per National building code.	14	Model Question Paper
19.	Identify the various hazards during the different stages of building construction.	7	Model Question Paper
20.	Discuss the important types of ergonomic hazards associated with industries.	7	Model Question Paper
21.	State the root causes of accident at construction site	6	Visvesvaraya Technological University (VTU)
Module - 4			
22.	Which are the hazards associated with manual material handling?	3	Model Question Paper
23.	Discuss the safety issues of Gas welding operations.	3	Model Question Paper
24.	Which are the various types of machine guarding devices used industries. Discuss the suitability of each machine guarding devices.	14	Model Question Paper
25.	With suitable sketches briefly explain seven defects of wire ropes.	14	Model Question Paper
26.	Explain the general safety measure for machine shop	8	Visvesvaraya Technological University (VTU)

27.	Explain the safety measure for lathe and milling machine	8	Visvesvaraya Technological University (VTU)
28.	Discuss the safety precautions to be taken for handling materials with the help of lifters in industries	8	Visvesvaraya Technological University (VTU)
Module - 5			
29.	Differentiate Hazard and Risk.	3	Model Question Paper
30.	Why MSDS is mandatory for chemical products.	3	Model Question Paper
31.	What is Hazard and Operability Analysis? How do you conduct a HAZOP analysis?	14	Model Question Paper
32.	Discuss about different types of chemical hazards.	14	Model Question Paper
33.	List the information described in MSDS and explain its significance in hazard control	8	Visvesvaraya Technological University (VTU)
34.	Classify fire extinguishers. Explain with neat sketch of carbon dioxide extinguisher	8	Visvesvaraya Technological University (VTU)
35.	With board classification, discuss different types of fire	8	Visvesvaraya Technological University (VTU)

QUESTION BANK

Subject: Renewable Energy Engineering (MET 445)

Sl.No.	Question	Marks	Year
	MODULE-1		
1.	What is the present status of various modes of renewable power generations in India. Explain.	5	2017(Dec)
2.	Define and explain the following angles as related to solar geometry: (i) Surface azimuth angle (ii) Declination angle (iii) Latitude angle	5	2017(Dec),2018,2020(Sep)
3.	a) Explain various energy storage systems. Give advantages and disadvantages of each. b) List the merits and de-merits of non-conventional energy resources	6 4	2017(Dec)
4.	a) Find the hour angle at the sunrise and the sunset on March 22 for a surface inclined at an angle of 20^0 facing south at New Delhi (280 35' N, 770 12' E).	6	2017(Dec)
5.	Explain the principle and working of the following solar radiation measuring instruments: (i) Pyranometer (ii) Pyrheliometer and (iii) Sunshine recorder	7	2017(Dec),2019(May & Dec),2020
6.	What is solar constant? Explain.	3	2017(Dec),2018,2019
7.	a) Elaborate the availability and limitations of conventional sources of energy and its impact on human life. What are the alternate solutions? b) Explain the non-conventional energy resources available in Indian energy scenario.	5 5	2018(April)
8.	Define i) declination angle ii) inclination angle iii) tilt angle iv) angle of incidence and v) zenith angle	5	2018(Dec)
9.	a) Explain mechanical and chemical methods of energy storage. b) Describe construction and working of a Pyranometer.	6 4	2018(Dec)
10.	Calculate the sunset hour angle and day length at location latitude of 35^0N, on Feb 14.	3	2019(May)
11.	Define Solar Constant. Calculate the number of daylight hours in Srinagar for 22nd June .The latitude of Srinagar as 34º05'N.	5	2019(Dec)

MODULE-2			
1.	Draw and Explain the VI characteristics of a solar cell. How does temperature affect the performance of solar cell?	5	2017(Dec),2018
2.	Explain the principle, working and components of a solar flat plate collector	4	2017(Dec)
3.	Classify solar cell based on the type of material used. Explain each one.	5	2017(Dec)
4.	Draw and explain the block diagram of a standalone solar PV power system	5	2017(Dec)
5.	A certain PV cell is illuminated with an irradiance of 1000 W/m_2. If the cell is 100 mm X 100 mm in size and produces 3 A at 0.5 V at the maximum power point. What is the conversion efficiency?	3	2017(Dec)
6.	What is maximum power point tracking?	2	2017(Dec)
7.	Compare different types of solar cells with reference to their construction and efficiency.	5	2018(April)
8.	a) Elaborate the availability and limitations of conventional sources of energy and its impact on human life. What are the alternate solutions? b) Explain the non-conventional energy resources available in Indian energy scenario.	5 5	2018(April)
9.	a) Distinguish between concentrating and non-concentrating type solar collectors and also draw the schematic diagram of a flat plate collector. Explain its working. b) 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 5	2018(April),2019(May & Dec)
10.	Draw and Explain the equivalent circuit of a practical solar cell	5	2018(Dec),2020(Sep)
11.	What are the factors which affect the performance of a solar thermal collector.	5	2018(Dec)
12.	a) Differentiate between flat plate collectors and solar concentrators and compare their performance based on concentration ratio, collector efficiency and temperature range. b) Compare conventional and non-conventional sources of energy.	6 4	2018(Dec)
13.	Discuss the effect of temperature and insolation on the characteristics of a solar cell.	4	2018(Dec)
14.	Briefly explain the applications of a solar PV system.	5	2018(Dec)
15.	Derive the expression for power extracted from wind.	5	2018(Dec)

16.	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	2019(May)
17.	Describe a stand-alone PV system.	4	2019(May & Dec)
18.	What is a module, array and panel with reference to a solar PV system.	2	2019(May)
19.	Define (i) Open Circuit Voltage (ii) Short circuit Current (iii) Fill factor and (iv) Efficiency of the solar cell	5	2019(Dec)
20.	a) Explain any two application of solar PV systems with block diagrams. (6) b) With a neat diagram explain the Grid connected PV systems	6 4	2020(Sep)
	MODULE-3		
1.	Discuss the different types of wind turbine rotors used to extract wind.	5	2017(Dec)
2.	Explain the terms solidity, pitch angle, tip speed ratio, cut-in speed and cut speed of wind turbine	5	2017(Dec)
3.	Determine the power output of a wind turbine whose blades are 12 m in diameter and when the wind speed is 6 m/s, the air density is about 1.2 kg/m^3 and the maximum power coefficient of the wind turbine is 0.35.	5	2017(Dec)
4.	Derive the expression for power in the wind. Define the term capacity factor of wind power plant.	5	2018(April),2020(Sep)
5.	Explain the lift and drag forces in wind and its importance in wind power generation.	5	2018(April)
6.	a) Give the site selection criteria for wind plants and write a note on wind energy potential in India. b) Draw the block diagram of a typical wind energy conversion system and explain the working of wind power plant.	5 5	2018(April)
7.	Explain how wind power plants are classified. Explain vertical axis wind turbine with necessary diagrams.	5	2018(April)
8.	Discuss the factors affecting the wind speed at an area.	5	2018(Dec)
9.	List the advantages and disadvantages of wind energy conversion system	5	2018(Dec)
10.	Draw the block diagram of a wind energy conversion system and explain the parts and their functions	5	2018(Dec)
11.	The following data relate to a wind turbine: Velocity of wind at 15^0C= 10 m/s Turbine diameter=10m Operating speed of the machine=35 rpm at maximum efficiency of 40%	6	2019(May)

	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		
12.	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	2019(May)
13.	With a neat diagram explain the construction of a propeller type wind power system	6	2020(Sep)
	MODULE-4		
1.	List out any five merits and demerits of OTEC.	5	2017(Dec)
2.	Discuss the basic principle of OTEC. Describe a closed cycle OTEC with its advantages and disadvantages.	10	2017(Dec)
3.	a) 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. b) What is pitch control of wind turbine? Explain. (4)	6 4	2017(Dec)
4.	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?	10	2018(April)
5.	a) Compare the working of an open cycle, closed cycle and hybrid cycle OTEC plants with neat sketches.	6	2018(Dec)
6.	What are the advantages and disadvantages of ocean thermal energy conversion systems?	5	2019(May)
7.	Give a comparison between horizontal and vertical axis wind machines.	5	2019(May)
8.	Describe a hybrid cycle OTEC system.	6	2019(May),2020(Sep)
9.	Differentiate between Closed cycle and Anderson cycle OTEC	5	2019(Dec)
10.	What are the factors affecting the site selection of OTEC.	4	2019(Dec),2020(Sep)
	MODULE-5		
1.	With a neat diagram, explain the working of biogas plant	5	2017(Dec)
2.	Explain any two types of biogas plants? Discuss the factors which decide the quality of biogas.	5	2017(Dec)
3.	With a neat schematic diagram, explain the biomass gasification based electric power generation system.	5	2017(Dec)

4.	a) Explain the how urban waste is converted into useful energy. b) Explain the process of anaerobic digestion of biomass into biogas. Draw the schematic diagram of a biodigestor.	5 5	2018(April)
5.	Draw the schematic of a KVIC type of bio gas plant	5	2018(Dec),2020(Sep)
6.	Explain the production of ethanol from biomass for fuel applications	4	2018(Dec)
7.	a) Write brief notes on any three types of gasifiers used for biomass to fuel conversion.	6	2018(Dec)
8.	What is anaerobic digestion? Explain briefly.	5	2019(May)
9.	What is biofouling? How can it be prevented?	4	2019(May & Dec)
10.	What are biomass resources? Enumerate the processes which are used for biomass conversion.	5	2019(May)
11.	Briefly explain the hydrogen energy system with necessary diagram	5	2019(Dec)
12.	Compare the construction and performance of floating drum type and fixed dome type biogas plants with the help of neat sketches.	6	2019(Dec)
13.	Explain the importance of biomass programme in India	4	2020(Sep)