QUESTION BANK
S5 EEE

EE301: Power Generation, Transmission and Protection

Module 1			
Sl. No	**Questions**	**Marks**	**KU/ KTU (Month / Year)**
1	What are the limiting factors in tapping the wind and solar potential?	5	KU May 2019
2	With a neat sketch explain the principle of working of a High Head Hydro-electric Power Station.	5	KU May 2019
3	With the help of a block diagram explain wind power generation	5	KU Dec 2018
4	Enlighten upon the various components and their operation in a hydroelectric Power plant for energy production.	5	KU Dec 2018
5	Explain Nuclear plants using a neat sketch.	5	KTUDec 2017
6	Briefly Describe Solar power plant with Block Diagram.	5	KTU April2016
7	Explain Thermal power plants using a neat sketch.	5	KTUDec 2017
8	Explain the term Load factor, Load curve and write its features.	5	KTU Dec 2017
9	What is diversity factor? What is its significance?	5	KTU April 2016
10	Design a capacitor bank for 5HP motor load to improve its power factor from .8 lag to unity	5	KTU April 2016
11	Write using figures and equations how the power factor is improved using capacitors in power system.	5	KTU Dec2017

Module 2			
1	Explain the principle and causes of proximity effect and Ferranti effect using appropriate figures	5	KTU May 2019
2	Derive the inductance of a single phase transmission line with three conductors arranged vertically in Side A and two conductors in Side B. The distance between adjacent conductors in each Side is 6m and that between the sides are 8m. Each conductor is of radius 0.3cm.	5	KTU May 2019
3	State Skin Effect and Ferranti Effect and elucidate them with necessary diagrams	5	KTU Dec 2018
4	Derive the expression for capacitance in a single phase overhead line under the influence of earth effect.	5	KTU Dec 2018
5	Classify transmission lines according to their length and enlist the line models. Derive the ABCD constants for medium lines using nominal π method.	5	KTU Dec 2018
6	A 3 phase 80km long Transmission line has its conductors of 1cm diameter spaced at the corners of the equilateral triangle of 100cm side. Find the inductance per phase of the System.	5	KTUDec 2017
7	Derive an expression for the Capacitance per phase of a 3 phase double circuit overhead Transmission line with unsymmetrical spacing (Transposed line).	5	KTU April2016
8	A 3phase, 50 Hz, 132 kV OH Line has conductors placed in a horizontal plane4m apart. Conductor diameter is 2 cm. If the line length is 100km calculate the charging currents per phase assuming complete transposition	5	KTU April2016
9	Evaluate the generalized circuit constants for medium transmission line using Nominal T Method. Draw the phasor diagram also.	5	KTUDec 2017

10	Derive the L-L Capacitance of a two wire line.		
11	The sending end voltage and receiving end voltage of a 3 phase line are 240 kV and 220kV line to line respectively. Its generalized constants of one phase are: A = D = 0.99 + j0.0132Ω, B = 24.75 + j165 Ω and C = -0.000044 + j0.0011℧. Draw the Receiving end power circle diagram and determine active and reactive power received when the angle between sending end and receiving end voltage phasors is 30°.	5	KTUDec 2017
12	A 3phase, 50 Hz, 150 km overhead transmission line has the following distributed constants per phase: Resistance/km = 0.10, Reactance/km'= 0.50, Susceptance/km = 3x10-6 S. If the line delivers 50 MW at 110 kV and 0.8 p.f. lagging. Determine: i) Sending end current ii) Sending end voltage for this load. Use Nominal n method.	5	KTU April2016
	Module 3		
1	What are the critical voltages in the formation of Corona? What is the effect of Corona?	5	KTU May 2019
2	Following results are obtained by making experiments on three phase, three core metal sheathed cable: (a) Capacitance between all the three bunched conductors and sheath is 1.2 micro Farad. (b) Capacitance between any one conductor and sheath and the other two being insulated is 0.8 micro Farad. Calculate the capacitance (C) between any two conductors when the third conductor is connected to the sheath.	5	KTU May 2019
3	A transmission line conductor at a river crossing is supported from two towers at a height of 45m and 75m above the water level. The span length is 300m. Weight of the conductor is 0.85kg/m. Determine the clearance between the conductor and water at a point	5	KTU May 2019

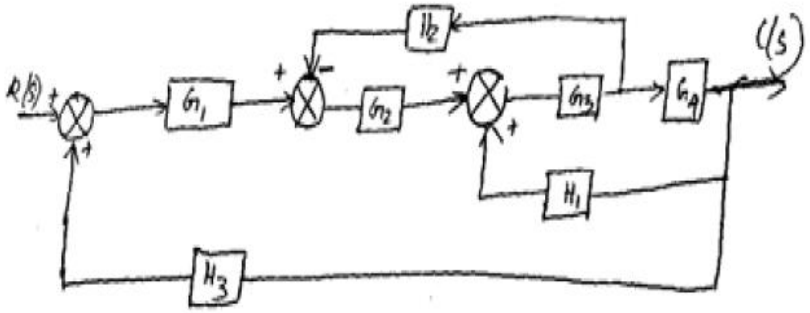
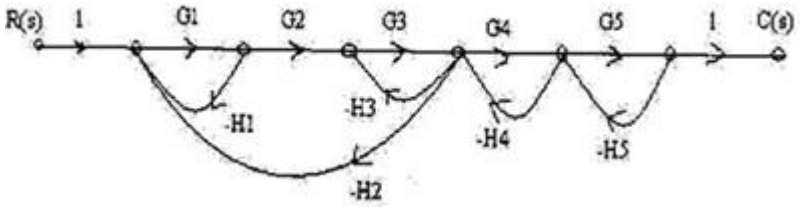
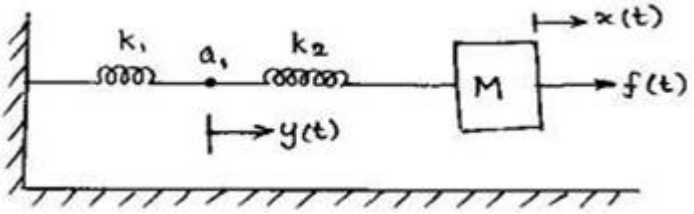
	midway between towers if the tension in the conductor is 2050kg.		
4	Comment on the effect of wind and ice loading on transmission line with respect to change in sag calculation.	5	KTU Dec 2018
5	Illustrate the methods used for improving string efficiency of overhead line insulators.	5	KTU Dec 2018
6	Derive the expressions for capacitance and insulation resistance of a single core cable.	5	KTU Dec 2018
7	Explain the advantages and disadvantages of corona.	5	KTU Dec 2018
8	State the methods of improving string efficiency.	5	KTUApril2018
Module 4			
1	What is the expansion of FACTS? What are the devices used as FACTS devices? Why are they significant in the present scenario?	4	KTU May 2019
2	What are the advantages and disadvantages of HVDC transmission systems?	4	KTU May 2019
3	What are the advantages of bundling of conductors?	2	KTU May 2019
4	List the advantages and disadvantages of HVDC transmission.	5	KTUDec 2018
5	With the aid of single line diagrams, differentiate between mono polar and bipolar types of HVDC links. Comment on their use in the system.	5	KTUDec 2018
6	Discuss the various conductor materials used for overhead lines. What are their relative merits and demerits?	5	KTUDec 2018
7	Draw the configuration of FC+TCR. Explain its operation.	4	KTUDec 2018
8	Explain different Configurations of HVDC systems ?	5	KTU April

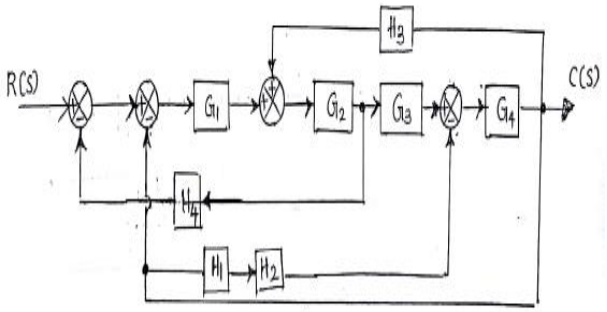
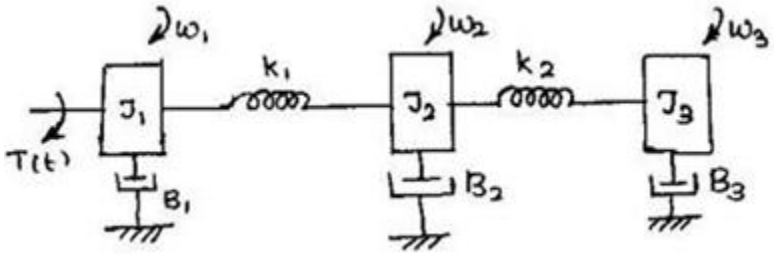
			2018
9	Explain different types of DC links.	5	KTUDec 2017
	Module 5		
1	What are the essential qualities required by any insulating medium used for arc quenching? What are the usual insulating media used?	5	KTU May 2019
2	Explain the significant features of a Microprocessor based relay.	5	KTU May 2019
3	With a neat sketch explain the principle of operation of an Air Blast Circuit Breaker	5	KTU May 2019
4	Explain the principle of operation of a static over current relay.	5	KTU May 2019
5	Discuss the problems associated with capacitive current chopping.	5	KTU Dec 2018
6	With a neat diagram, explain the arc extinction in VCB.	5	KTU Dec 2018
7	Derive the expression for Rate of Rise of Restriking Voltage.	5	KTU Dec 2018
8	Drive the Essential Qualities of Protective relays.	5	KU Dec 2015
9	Define the terms Restriking voltage, Recovery voltage, Zones of protection,properties of SF6 gas	5	KTU May 2017
	Module 6		
1	What makes the differential protection very significant in the protection schemes of electrical machines and transformers?	5	KTU May 2019

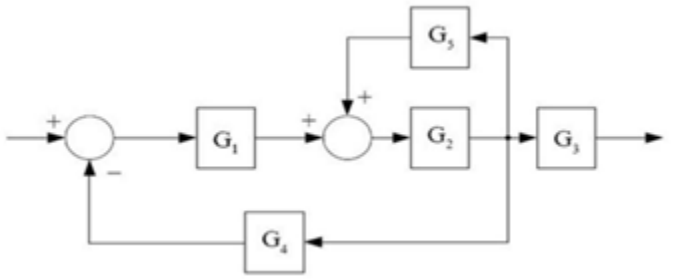
2	What are the three main protection aspects included in the protection of alternators? Why are they significant?	5	KTU May 2019
3	What is meant by earth fault protection of an alternator? How is it implemented?	5	KTU Dec 2018
4	Explain Insulation Coordination.	5	KTUApril2018
5	Explain Buchholz Relay and write its importance in Transformer protection		
6	What are the important faults on alternator? Explain any two stator faults and rotor faults and its protection schemes?		
7	Explain distance protection scheme for protection of feeders?	5	KTUApril2018
8	Explain differential protection scheme for Transformers.	5	KTUApril2018
9	Explain operation of buchholz relay?	5	KU Dec 2015
10	Write short note on surge diverters	5	KTUDec 2017
11	What do you mean by insulation coordination?	5	KU Dec 2015

QUESTION BANK

LINEAR CONTROL SYSTEMS (S5 EEE) (EE303)

Sl No.	Question	Marks	
	Module 1		
1	(i)How could you determine the Transfer Function of the system Shown in the fig? 	7	KTU Dec 2017
2	Solve C/R for the signal flow graph shown below 	10	KTU Dec 2017
3	Consider the Mechanical system shown below and write the Differential equation. 	7	KU May 2015
4	Write the differential equations governing the mechanical system in the figure. Draw the force voltage and force current electrical analogous circuits	7	KU May 2015

5	Give a comparison between open loop & closed loop control systems		KTU Dec 2017
6	Using block diagram reduction technique find the transfer function C(s)/R(s) for the system shown in fig 	10	KTU Dec 2018
7	Draw the torque-voltage electrical analogous circuit for the mechanical system shown below. 	10	KU May 2015
8	State any five block diagram reduction rules with example.	5	KU 2010
9	Mention in detail about any five terminologies used in signal flow graph	5	KU 2010
10	Demonstrate the differential Equations governing the mechanical system shown in the fig. and determine the transfer function.	10	KTU Dec 2017
11	Explain with a neat block diagram explain the working of Armature controlled DC motor as a control system	6	KU May 2011
12	Estimate the overall transfer function of the system shown in the fig.	5	KTU Dec 2018

			
	Module II		
1	What are the various standard test signals? Draw the characteristics diagram and obtain the mathematical representation of all.	5	KU May 2011
2	The Unity feedback system is characterized by the open loop transfer function $G(S) = \frac{k}{s(s+10)}$. Estimate the gain K, so that the system will have the damping ratio of 0.5. For this value of K, Determine the settling times, peak overshoot, and time to peak overshoot for a unit step input.	6	KTU Dec 2017
3	Consider a Second order model $\frac{Y(S)}{R(S)} = \frac{\omega_n^2}{s^2 + 2\varepsilon\omega_n s + \omega_n^2}$, $0 < \varepsilon < 1$. . Deduce the response y (t) to a unit step input	6	KU2010
5	The open loop transfer function of a unity feedback control system is given by $G(S) = \frac{k}{s(sT+1)}$ where K and T are positive constants. Demonstrate by what factor the amplifier gain should be reduced so that the peak overshoot of unit step response of the system is reduced from 75% to 25%.	7	KTU Dec 2017
6	Find the time response analysis of a first order system for step and ramp input.	5	KU 2010
7	Write the response of un damped second order system for unit step input.	7	KU 2010
8	How will you explain the meaning of for Rise time, fall time, settling time, peak overshoot with expressions?	5	KTU Dec 2017
9	A unity feedback system with unit step input for which open loop transfer function,	7	

	$G(s) = \frac{16}{s(s+8)}$ the natural Frequency, the damping ratio and the function, the natural Frequency, the damping ratio and the damped frequency of oscillation.		
10	Sketch the response of under damped second order system and mark various time domain specifications	4	KTU April2018
	MODULE III		
1	A unit ramp input is applied to a unity feedback system whose output response is $C(s) = \frac{100}{s2+5s+100}$ Analyze the time response and steady state error.	7	KU May 2009
2	For a unity feedback control system the open loop transfer Function. $G(s) = \frac{10(s+2)}{s^2(s+1)}$ Calculate Kp, K_V, K_a and the steady state error when the input is R(s) where $R(s) = \frac{3}{s} - \frac{2}{s^2} + \frac{1}{3s^3}$	7	KU June 2007
3	Develop an Expression to find steady state error of closed loop system.	6	KU May 2011
4	A unity feedback system has the forward transfer function $G(s)=KS/(1+s)^2$ for the input , r(t) = 1+5t formulate the minimum value of K so that the steady state error is < 0.1	6	KU May 2011
5	The open loop transfer function of a servo system with unity feedback is 10/{s(0.1s+1)} . Determine the static error constants of the system. Calculate the steady state error of the system, when subjected to an input given by $r(t)=2+4t+\{t^2/6\}$	5	KTU Dec 2017
6	A certain unity negative feedback control system has the following forward path transfer function k(s+2)/s(s+5)(4s+1) . The input applied is r(t)= 1+3t . Find the minimum value of K so that the steady state error is less than 1.	6	KU May 2011

7	The open loop transfer function of a unity feedback system is given by 20/s(s+2) .The input function is $2+3t+t^2$. Examine the generalized error coefficient and steady state error.	7	
8	Analyze the steady state errors for unit step, unit ramp and unit acceleration input. For a unity feedback system characterized by the open loop transfer function . Also determine the damping ratio and natural frequency of dominant errors	7	KU May 2011
9	Write detailed notes on relative stability with its roots of Splane.	5	KTU April 2018
10	State and explain about different cases of Routh Hurwitz criterion.	6	
11	Point out the concepts BIBO stability.	5	
12	(i)Interpret Routh array and determine the stability of the system whose characteristic equation is . Comment on the location of the roots of Characteristic equation. (ii) Summarize the rules used for construction of the Root Locus of a feedback system	7	KTU Dec 2017
	MODULE IV		
1	The open loop transfer function of a unity feedback system is given by G(s)=K/s(s+1)(s+3) . Sketch the root locus of the system and the evaluate the system stability with respect to their location of poles	6	KU May 2011
2	Explain the effect of addition of poles and zeros on the nature of root locus	4	KTU April 2018
3	Determine the stability of the system whose overall transfer function is given below G(s)=(2s+5)/{s(0.4s+1)(0.1s+1)}	5	KU May 2011
4	Explain the nature of time response of a second order system according to the location of roots of the characteristic equations	5	KTU April 2018
5	A Unity feedback control system has an open loop TF G(s)=K9s+1.5)/s(s+1)(s+5) . Sketch the root locus	6	KU May 2011
6	As certain stability of the system whose characteristic equation is $s^6+3s^5+5s^4+9s^3+8s^26s+4=0$	10	KTU April 2018

	Also find the number of roots lying on the left half , right half and imaginary axis of the s-plane		
7	Sketch the root locus for a system with G9s).H(s)=K/s(s+2)(s2+2s+2) Hence determine the range of K for the system stability.	10	KTU April 2018
8	What is root locus. What are the information obtained from aroot locus	5	KTU Dec 2017
	MODULE V		
1	Explain gain Margin and Phase margin	5	KTU Dec 2017
2	Evaluate the stability of the unity feedback system $\frac{20}{S(1+3S)(1+4S)}$ using bode plot.	10	KU May 2011
3	Report the value of gain and phase cross over frequencies for the following function using bode plot $G(S) = \frac{10}{S(1+0.4S)(1+0.1S)}$	10	KTU Dec 2017
4	Develop the detailed notes on following: (i) Frequency domain specification. (ii) Derive any two frequency domain specification parameters	10	KU May 2011
5	A unity feedback control system has $G(s) = \frac{ks^2}{(1+0.2s)(1+0.02s)}$, , Find the Bode plot. Find K when GCOF = 5rad/sec	10	KTU Dec 2017
6	Given $G(s) = \frac{ke^{-0.2s}}{s(s+2)(s+8)}$ Draw the Bode plot and find K for the following two cases:	10	KU May 2011

	(i) Gain margin equal to 6db (ii) Phase margin equal to 45°.		
7	Evaluate the frequency domain specification of a second order system when closed loop transfer function is given by $C(S)/R(S)=\frac{164}{s^2+10s+64}$	10	KTU Dec 2017
8	Determine the Phase angle of the given transfer function $G(s)=\frac{10}{S(1+0.4S)(1+0.1S)}$	10	KU May 2011
	MODULE VI		
1	Consider a unity feedback system having an open loop transfer Function G9s)=K/s(1+0.5s)(1+4s) Outline the polar plot and determine the value of K so that (i) Gain margin is 20db (ii) phase margin is 30	10	KTU April 2018
2	Find the location of roots on S-plane and hence the stability of the system.	6	KTU 2018
3	Explain the procedure for Nyquist Stability Criterion.	6	
4	Sketch the polar plot and find the gain and phase margin of a control system has $G(s)=K/s(s+2)(s+3)$ with unity feedback.	10	KTU April 2018
5	Describe about nyquist contour and its various segments	5	KTU 2018
6	Express the mathematical preliminaries for nyquist stability criterion	5	KU May 2011
7	Draw Nyquist plot for the system whose open loop transfer function is G9s).H(s) =K/s(s+2)(s+10).Determine the range for K which the closed loop system is stable.	10	KU May 2011
8	Explain the steps involved in obtaining the polar plot	5	KTU April 2018
9	Write short notes on Nichols Chart	5	KTU April 2018

10	State & explain Nyquist stability criterian	5	KTU April 2018
11	Write notes on the following (i)Non minimum phase systems (ii) Transportation lag	5	KTU April 2018

POWER ELECTRONICS			
Module 1			
Sl. No	**Questions**	**Marks**	**KU/ KTU (Month/ Year)**
1	"A thyristor can be triggered by an external gate pulse"- Justify using two transistor analogy of thyristor.	5	KTU APRIL 2018
2	a) With neat sketches, explain the static V-I characteristics of an SCR. Define latching and holding current.	6	KTU APRIL 2018
	b) Two thyristors having a difference of 4 mA in latching current are connected in series. The voltage across the devices are 500 V and 480 V. Calculate the derating factor and thestatic equalizing resistance value for maximum string efficiency.	4	
3	Compare Thyristor, Power MOSFET and IGBT on the basis of following parameters: i) Switching frequency ii) Voltage and current ratings iii) Applications (at least two)	5	KTU APRIL 2018
4	Draw the circuit for two transistor analogy of silicon controlled rectifier and briefly describe the working.	5	KTU DEC 2017
5	a) Derive the expression for resistance used for static voltage equalisation for a series connected string.	5	KTU DEC 2017
	b) In a power circuit, 4 SCRs are to be connected in series in a string to handle 6kV and 1kA. The voltage and current ratings of SCRs are 1800V and 1000A and have a maximum difference in their blocking currents of 10mA. Difference in recovery charge is 10μC. Design a suitable equalizing circuit with figure.	5	KTU DEC 2017
6	a) Explain the structure & principle of operation of IGBT.	5	KTU DEC 2017

	b) Draw RC triggering circuit for SCR and explain with relevant wave forms.	5	KTU DEC 2017
7	Define holding current and latching current of SCR. Show these currents on the static IV characteristics of SCR.	5	KTU DEC 2018
8	a) Discuss the condition which must be satisfied for turning on the SCR with a gate signal.	5	KTU DEC 2018
	b) Explain the significance of di/dt protection in thyristors and describe the method employed for improving the same	5	
9	What are the steps to be employed to prevent the difficulties of parallel operation of thyristors?	4	KTU DEC 2018

Module 2

Sl. No	Questions	Marks	KU/ KTU (Month/ Year)
1	Explain how the firing angle of an SCR can be varied by using a UJT relaxation oscillator.	5	KTU APRIL 2018
2	Compare the maximum power that can be handled by fully controlled rectifier in mid- point and bridge configuration if the firing angle is 30º and the reverse voltage rating (peak) of the thyristors is 200V.	5	KTU APRIL 2018
3	a) Explain a half-wave controlled rectifier feeding RL load, with waveforms of (6) output voltage and output current. Derive the expression for average output voltage.	6	KTU APRIL 2018
	b) A single phase semi-converter fed from 120 V, 50 Hz supply is connected to a (4) load resistance of 10 Ω. If the average output voltage is 25% of its maximum possible average output voltage, find the circuit turn off time.	4	
4	Derive the expression for the output voltage of half wave controlled rectifier with R load	5	KTU DEC 2017
5	A single phase semi converter delivers a constant load current I_O . Express its source current in Fourier Series and	10	KTU DEC 2017

	derive the expressions for displacement factor and current distortion factor.		
6	With the help of circuit diagram and waveform, explain the operation of RC triggering circuit for one thyristor	5	KTU DEC 2018
7	With the help of circuit diagram explain the working of single phase fully controlled converter with RL load. Draw the waveform of output voltage with and without freewheeling diode and output current.	10	KTU DEC 2018
8	With the help of circuit diagram explain the operation of single phase semi converter with RL load. Draw the waveform of input voltage, output voltage, load current and voltage across the thyristor.	6	KTU DEC 2018
	Module 3		
Sl. No	**Questions**	**Marks**	**KU/ KTU (Month/ Year)**
1	What is the role of freewheeling diode in a 3 phase semi-converter?	5	KTU APRIL 2018
2	a) Draw the circuit for three phase full converter feeding RLE load. Sketch the output voltage waveform for a firing angle of 60^0.	6	KTU APRIL 2018
	b) A three-phase half-wave controlled converter is connected to 380 V (line) supply. If the load current is constant at 32 A independent of the firing angle and on state forward drop of SCRs is 1.2 V, Find: i) Peak reverse voltage rating of SCRs ii) Average power dissipation in each SCR	4	
3	Explain the basic working of an ideal Dual converter and its four-quadrant operation.	6	KTU APRIL 2018
4	Draw the input and output voltage waveforms of 3ø half controlled rectifier with R load for a firing angle of 30^0.	5	KTU DEC 2017

5	Draw the circuit of 3 phase fully controlled rectifier with RLE load and explain the working for $\alpha=60^o$ with necessary waveforms. Derive the expression for output voltage.	10	KTU DEC 2017
6	Explain how two 3 phase full converters can be connected back to back to form a circulating current type of dual converter with the help of waveforms.	10	KTU DEC 2017
7	A three phase half wave converter is operated from 3–phase, 230 V, 50Hz supply with load resistance R= 10Ω. An average output voltage of 50% of the maximum possible output voltage is required. Determine i) the firing angle, ii) average and rms values of load current	5	KTU DEC 2018
8	a) With the help of circuit diagram explain the working of three phase fully controlled converter.	5	KTU DEC 2018
	b) Sketch the waveform of input voltage, output voltage and output current of a three phase fully controlled converter with R load operating at $\alpha = 30^o$.	5	KTU DEC 2018
9	With the help of circuit diagramexplain the working of single phase dual converter with circulating current mode.	5	KTU DEC 2018

Module 4

Sl. No	**Questions**	**Marks**	**KU/KTU (Month/ Year)**
1	Compare voltage source and current source inverters.	5	KTU APRIL 2018
2	A single-phase half bridge inverter has a resistive load of 10 Ω, and a center-tap dc input voltage of 96 V. Obtain the Fourier series representation of the output voltage waveform and hence find the value of distortion factor.	4	KTU APRIL 2018
3	Explain the 120^0conduction mode of a three-phase bridge inverter with output voltage waveforms, indicating the devices conducting in each state.	10	KTU APRIL 2018

4	What are the different classifications of inverters?	5	KTU DEC 2017
5	Explain the operation of 3 phase voltage source inverter with 180^o mode of operation.	10	KTU DEC 2017
6	With the help of circuit diagram explain the working of current source inverter.	5	KTU DEC 2018
7	a) Describe the working of a three phase voltage source inverter with an appropriate circuit diagram.	4	KTU DEC 2018
	b) Draw the phase and line voltagewaveform of the three phase voltage source inverter with star connected resistive load on the assumption that each IGBT conducts for 180^o	6	KTU DEC 2018
8	Write Fourier series expression for the output voltage from the single phase half bridge and full bridge inverter and determine the equation for THD.	5	KTU DEC 2018

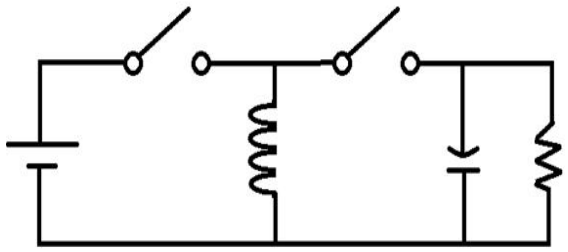
Module 5

Sl. No	Questions	Marks	KU/ KTU (Month/ Year)
1	What is sequence control in single phase ac voltage controllers? What are the advantages of employing it?	5	KTU APRIL 2018
2	Explain sine PWM technique, with relevant waveforms. Define modulation index and mention its significance.	5	KTU APRIL 2018
3	a) Explain the operation of single phase voltage controller with RL load with output voltage and current waveforms.	6	KTU APRIL 2018
	b) For a single-phase voltage controller, develop a relationship between conduction angle and firing angle. Under what condition conduction angle equals π?	4	
4	Explain the terms modulation index and frequency modulation ratio related to pulse width modulation.	5	KTU DEC 2017

5	What are the control strategies for the regulation of output voltage in ac voltagecontrollers?	5	KTU DEC 2017
6	For a single phase voltage controller feeding a resistive load, describe the working with reference to source voltage, source current, output voltage and output current.	10	KTU DEC 2017
7	What is pulse width modulation? List the various PWM techniques.	5	KTU DEC 2018
8	Explain the principle of phase control in a single phase ac voltage controller	5	KTU DEC 2018
9	a) Explain with suitable diagram, the principle of voltage control with single pulse width modulation.	5	KTU DEC 2018
	b) With the help of circuit diagram explain the working of single phase ac voltage controller with R load.	5	
10	Describe how multiple pulse modulated wave can be generated from carrier and reference wave.	5	KTU DEC 2018

Module 6

Sl. No	**Questions**	**Marks**	**KU/KTU (Month/ Year)**
1	A type A chopper has input voltage of 200 V. The current through a load of R=10Ω in series with L=80 mH, varies between 12 A and 16 A. Find the form factor of the output voltage waveform.	5	KTU APRIL 2018
2	Design a dc-dc converter with 12 V input and 200 V output at up to 50W. The ripple in the output voltage and input current should not exceed ±5% and ±20% respectively. Choose an appropriate switching device and frequency.	5	KTU APRIL 2018
3	a) Design a simple light dimmer circuit using TRIAC including the trigger circuit.	4	KTU APRIL 2018
	b) Explain the working of Two quadrant (Class C) chopper, with relevant waveforms.	6	

4	a) Derive the expression for output voltage of a Buck-Boost regulator, showing relevant waveforms	6	KTU APRIL 2018
	b) The switches in the figure are operated alternatively, each switch being on for half of each cycle. Determine the relationship between Vin and Vout 	4	
5	Explain time ratio control method to vary the output voltage in choppers.	5	KTU DEC 2017
6	Derive an expression for average output voltage in terms of input dc voltage and duty cycle for a step up chopper.	5	KTU DEC 2017
7	Describe the working of four quadrant chopper with relevant circuit diagrams and its operation in all the four quadrants.	10	KTU DEC 2017
8	Explain with circuit diagram and waveforms, the working of Buck regulator for continuous current mode. Obtain expressions for inductance and capacitance**.**	10	KTU DEC 2017
9	Draw the circuit of step up chopper and explain its working.	5	KTU DEC 2018
10	For a type A chopper, dc source voltage is 230 V, load resistance 10 Ω, drop across the switch is 2Vand duty cycle 0.4. Calculate average and RMS value of output voltage and chopper efficiency.	5	KTU DEC 2018
11	a) A step up chopper has input voltage of 120V and output voltage of 360 V. If the conducting time of the thyristor chopper is 100 μs, Compute the pulse width of output voltage	5	KTU DEC 2018
	b) With the help of circuit diagram and waveform explain the operation of buck converter and derive the equation of output voltage.	5	

12	Explain the design procedure of filter circuit for a boost converter with continuous current mode	5	KTU DEC 2018

EE307 : Signals & Systems

MODULE I

Sl. No	Questions	Marks	KTU/ KU (Month /Year)
1	Check the Linearity and time in variance of the system y(t)=t^2 x(t), where x(t) & y(t) are the inputs and outputs respectively.	5	KTU APRIL 2018
2	Define unit step function and plot x(t) and x(2t), if x(t) = u(t+2)-u(t-2)	5	KU Dec 2015
3	Check whether the given signal x(t) is energy or power signal. Find the energy & power of the signal x(t)=e^-5t * u(t)	4	KU Dec 2017
4	The impulse response of a LTI system is h(t) = (2+e^- 3t) u(t).Check whether the system is (i)Stable (ii) Causal (iii) Memory or memory less	6	KTU Dec 2017
5	Find the response of a LTI system with the impulse response h(t) = e^-2t * u(t) for an input x(t)=t u(t)	4	KTU Dec 2017
6	Distinguish between Energy & Power signals. Give an example for each category	4	KTU Dec 2016
7	Evaluate the fundamental period of the signal x(t) = 2 Sin(2t+1) +3 Sin(4t-1)	4	KU APRIL2 018
8	Check whether the system y(t) = x(t).x(t-1) is (I) Linear (ii) Causal (iii) Time variant	6	KTU Dec 2017
9	Plot the signal x(t) = u(t+1) +2.u(t)-u(t-3)-2 u(t-5)	4	KU Dec 2017
10	Given x1(n) ={1,1,1} and x2(n) = {1,2} .Find the convolution of the sequences graphically	5	
	MODULE II		
1	What is the output sequence of a LTI system with impulse response h(n)={3,2} to the input x(n) ={1,2,3,3}	5	KTU APRIL2 018

2	Check the causality and stability of the systems whose impulse responses are given (i)h(t)=e^at u(t) (ii) h(n)=2^n u(-n) (a<0)	4	KTU Dec 2017
3	For the following system described by differential equation,find the impulse response,if the system is (i) Stable (ii) Causal d2 y(t)/dt2 + 5* d y(t)/dt + 6 y(t) = d2 x(t)/dt2 + 8 dx(t)/dt +13 x(t) Assume initial conditions as zero.	10	KTU Dec 2017
4	Derive the condition for stability of a discrete time LTI system in terms of its impulse response.	4	KTU APRIL2018
5	Find the output of an LTI system whose impulse response is h(t) to the input x(t).h(t) = u(t)-u(t-1)	8	KTU Dec 2017
6	For an LTI system, unit impulse response is given by h(t)=e^at u(t), a>0. Obtain step response of the system.	6	KTU Dec 2017
7	Obtain the differential equation representation of the circuit.	4	KTU APRIL2018
8	Using Laplace transform ,solve the differential equation obtained for the above and get voltage across the capacitor.	6	KTU Dec 2017
9	Find x(t)* h(t) where x(t) =u(t)-u(t-2),h(t) = e^-2t u(t) and * represents the convolution operator.	5	KTU Dec 2017
	MODULE III		
1	Obtain the exponential Fourier series of the signal x(t) = {1,1,1,1,2,2,2,2}	5	KTU APRIL2018
2	Find the Fourier transform of e^-a|t|	5	KTU APRIL2018
3	Sketch the magnitude & phase spectrum of the signals (I) x(t)=A e^a|t| (a>0)	4	KTU APRIL2018
4	What you mean by aliasing.	4	KTU

			July2017
5	Find the Fourier transform of sgn(t).Plot its magnitude & Phase response	4	KTU July2017
6	Show that x(t)=2Hx(-w).	5	KTU July2017
7	Using matrix method find the convolution of x(n) ={1,4,3,1} and h(n) = {1,2,3,2}	5	KTU Dec 2017
8	Give any five properties of nonlinear systems.	5	KTU APRIL2018
9	Using matrix method find the convolution ofx[n] = {1, 4,3, 1}and y[n] = {1, 2, 3, 2}	5	KTU Dec 2017
MODULE IV			
1	State and prove sampling theorem	10	KTU APRIL 2018
2	The impulse response of a system is given by h(n)={2,3,1}.Find the response of the system when it is excited by the input x(n) = u(n-1)-u(n-5)	6	KTU APRIL 2018
3	Explain energy spectral density & power spectral density	4	KTU APRIL 2018
4	Determine the Fourier series representation of the following discrete time signal and sketch the frequency spectrum x(n)={.....1,2,-1,1,2,-1,1,2,-).	10	KU April 2016
5	a) Find x(t) * h(t) where, x(t) = u(t) — u(t — 2), h(t) = e"“"u(t)and * represents the convolution operator. b) How will you determine the stability of a system from tts transfer function?	10	KTU April 2018
6	a) The impulse response of a system is given by h(n) = Find the response of (6) the system when it is excited by the input x(n) = u(n — 1) — u(n — 5).	5	KTU Dec 2017

7	Obtain Discrete Fourier transform of the following signals: i)x{n] = 0.5u[n] ii) x[n] = 0.5/n	10	KTU July 2017
8	Determine the stability of the following discrete transfer function: H(z)= z24+0.7Z+0.1 H (z) = z24+2.5z+1	10	KTU Dec 2017

MODULE V			
1	State & prove following properties of Z transform: (I) Multiplication by n (ii) Accumulation (iii) Convolution	6	KTU APRIL2018
2	Find inverse Z Transform of X(Z) = z/{2z^2 – 3z +1} .|z| <1/2	4	KTU APRIL2018
3	An LTI system is described by the difference equation y(n)-9/4y(n-1)+1/2y(n-2)=x(n)-3x(n-1) Determine h(n) for the following condition (I) The system is stable (ii)Causal	10	KTU Dec2017
4	Find the Z transform and ROC of x(n) =(1/3)^n u(n)	5	KTU Dec2017
5	Find the inverse Z transform of X(z) = 3Z^-1/(1-z^-1)(1-2z^-1)	5	KTU Dec2017
6	Write down the properties of ROC for Z transform	6	KTU July 2017
7	Find the Z transform of the sequence x(n)={1,2,3,-1,5,6}	5	KTU July 2017
8	Verify the time shifting property of Z transform and hence find the Z transform of x(n)=a^n+1 u(n+1)	4	KTU July 2017
MODULE VI			
1	State the properties of DFT (no proof required)	6	KTU APRIL2018
2	Obtain the DFT of the following signals: (i) x[n]=(0.5)6n u(n) (ii)x[n] = 0.5^|n|	4	KTU APRIL2018
3	Determine the stability of the following discrete transfer function (I) H(z)=z/z^2+0.7z+0.1	5	KTU APRIL2018
4	Give any five properties of non linear systems	5	KTU APRIL2018
5	Determine the Fourier series representation of the following signal and sketch the frequency spectrum x(n)={.....1.2.-1,1,2,-1,1,2,-1....}	10	KTU Dec 2017
6	The input to the sytem is x(n) ={1,2,0,2} h(n)={5,a,3} and output y(n) ={5,12,7,16,4,6} Using fourier transform find the value of "a'	4	KTU Dec 2017
7	For any periodic sequence find the Fourier coefficients and sketch the magnitude spectrum	7	KTU Dec 2017
8	y(n) = y(n -1) +5 y(n — 2) + x(n) — 3x(n- 1) Specify the ROC of H(z), and determine h(n) for the following	10	KTU April 2018

	conditions i) The system ts stable ii) The system is causal		

EE 309 Microprocessor and Embedded Systems

MODULE I

Sl. No	Questions	Marks	KU/ KTU Month/ Year
1.	Explain the different addressing modes of 8085.	6	KTU DEC 2017
2.	Explain the 8085 internal architecture with the help of a block diagram	10	KTU DEC 2017
3.	Explain the flags in 8085.	4	KU 2016
4.	Explain the architecture and functions of stack pointer and program counter.	10	KU 2016
5.	Explain demultiplexing of data/address bus.	5	KTU DEC 2017
6.	An array contains 10 elements. Find sum of even numbers. Assume 16 bit answer, store it in two consecutive memory locations.	10	KU 2016
7.	Write a program to find the smallest number among 100 numbers stored in consecutive memory locations.	10	KU 2017
8.	Write a program to find sum of 10 8 bit numbers stored in consecutive memory locations.	10	KU 2017
9.	Write a program to rearrange 10 numbers in ascending order.	6	(KTU APRIL 2018)
10.	Explain binary and BCD arithmetic in detail	10	

MODULE II

1.	Explain CALL and RETURN instructions with an example.	10	KTU 2017)
2.	Write a delay subroutine program for 0.4 ms, assuming clock frequency of 3 MHz.	5	
3.	Explain the timing diagram of LDAX D instruction.	10	KTU 2017

4.	Explain the terms machine cycle and T states.	4	KTU 2017
5.	Differentiate between instruction cycle, machine cycle and T states.	4	KU 2016
6.	Explain the timing diagram of IN data8 instruction.	10	KU 2017
7.	Explain the timing diagram of LDA 6200 H instruction.	8	KU 2016
8.	Explain the PUSH and POP instructions. How is data transferred with the stack?	8	KTU APRIL 2018
9.	How the interrupts of 8085 can be classified?	5	KTU-APRIL 2018
10	Compare microprocessor and microcontroller.	5	KTU/ APRIL 2018
11	Explain the PUSH and POP instructions of 8085 with example.	5	KTU - APRIL 2018

MODULE III

1.	Explain maskable and non-maskable interrupts along with interrupt related instructions.	5	KTU 2017
2.	Explain the interrupt structure and RIM instruction.	12	(KU 2016
3.	Explain maskable and non-maskable interrupts along with interrupt related instructions.	10	KTU 2017)
4.	Explain the control word format for I/O mode of 8255.	4	KTU APRIL 2017)
5.	With the help of a block diagram explain the operation of the 8255	10	
6.	Explain how the interrupts can be classified in 8051.	10	KTU APRIL 2017
7.	Suggest a suitable peripheral interface to input the	10	

	status of 4 switches (ON/OFF) connected to 8085 microprocessor and indicate their status by 4 LEDs connected to 8085. Illustrate the above with schematic		
8.	Design memory systems to interface 2K ROM and 2K RAM using 2K*8 memory chips.	8	KTU DEC 2017
9.	Explain PSW of 8051.	5	KTU APRIL 2018
10	Discuss about various Bit handling instructions of 8051.	5	KTU APRIL 2018

MODULE IV

1.	Explain hard and soft real time systems	8	
2.	Explain waterfall model and its advantages.	10	KTU APRIL 2018
3.	Explain the application domain of embedded systems.	8	
4.	Explain the features and characteristics of embedded systems.	8	
5.	Describe the embedded system development model.	4	KTU DEC 2017
6.	Give current trends and challenges in Embedded systems.	4	KTU DEC 2017)
7.	Explain assembler, compiler, linker and loader.	4	KTU DEC 2017
8.	Explain the difference between microcontroller and microprocessor.	4	KTU DEC 2017
9.	What are the uses of software tools for the development of an embedded system.	4	KTU APRIL 2018
10	Explain the internal Architecture of 8086	10	

MODULE V

1.	Explain instruction set of 8086 in detail.	10	KU-2013
2.	Write an assembly language program in 8086 microprocessor to find sum of digit of an 8 bit number using 8 bit operation.	10	KU-2013
3.	Write 8086 program to subtract any two 16-bit numbers with/without borrow	10	
4.	Write an assembly language program in 8086 microprocessor to find multiplication of two 8 bit numbers	10	
5.	Write an assembly language program in 8086 microprocessor to sort 8 bit numbers in assenting order	10	
6.	Write an assembly language program in 8086 microprocessor to convert BCD to Binary form	10	
7.	Write an assembly language program in 8086 microprocessor to subtract 2 8 bit numbers,	10	
8.	Assembler and assembler directives in 8086 microprocessor.	10	KU-2014
9.	Explain Instruction set of 8086 in detail.	10	
10	Explain about the Divide–by-Zero and Break point interrupt of 8086	6	
11	Write the 8086 instruction syntax for the following. I. Instruction to load the effective address II. Instruction to load Extra segment III. Instruction to multiply the signed data IV. Instruction for ASCII addition V. Instruction to convert Word to Double word.	5	KU-2014
12	Write the delay program of 1ms using 8086 processor.	6	

MODULE VI

1.	Explain the addressing modes of 8051.	10	KTU DEC 2017
2.	Explain about the register banks in 8051	10	

3.	Explain the different types of 8051 instructions	10	
4.	Explain the SFRs of 8051.	4	KTU DEC 2017
5.	Explain PSW of 8051.	4	KTU APRIL 2017
6.	Explain the bit handling instructions in 8051.	4	KTU APRIL 2017
7.	Explain the addressing modes of 8051.	10	KTU DEC 2017
8.	Explain about the register banks in 8051.	10	
9.	Explain the different types of 8051 instructions.	10	
10	Explain the addressing modes of 8051.	10	KTU DEC 2017

EE367 NEW AND RENEWABLE ENERGY SYSTEMS

Module 1			
Sl No.	Questions	Marks	KU/ KTU (Month/ Year)
1	What is the necessity of energy storage?	5	KTUDec 2018
2	Explain mechanical and chemical methods of energy storage.	6	KTUDec 2018
3	Discuss the current world and Indian energy scenario	5	KTUDec 2018
4	What is the present status of various modes of renewable power generations in India? Explain	5	KTUDec2017
5	List the merits and de-merits of non-conventional energy resources	4	KTUDec2017
6	Explain how current scenario of world energy consumption leads to the exploitation of renewable energy sources?	5	KTUApril2018
7	Compare conventional and non-conventional sources of energy	4	KTUDec2018
8	Explain various energy storage systems. Give its advantages and disadvantages of each.	6	KTUDec2017
9	Explain the necessity of energy storage in renewable power harnessing? Give the diagram and explain the operation of a pumped energy storage system.	5	KTU April2018
10	Elaborate the availability and limitations of conventional sources of energy and its impact on human life. What are the alternate solutions?	5	KTU April2018
11	Explain the non-conventional energy resources available in Indian energy scenario.	5	KTU April2018

Module 2			
Sl No.	**Questions**	**Marks**	**KU/ KTU (Month/ Year)**
1	Define and explain the following angles as related to solar geometry: (i) Surface azimuth angle (ii) Declination angle (iii) Latitude angle	5	KTUDec2017
2	Explain the principle and working of the following solar radiation measuring (instruments: (i) Pyranometer (ii) Pyrheliometer and (iii) Sunshine recorder. What is solar constant? Explain.	10	KTUDec2017
3	Distinguish between concentrating and non-concentrating type solar collectors and also draw the schematic diagram of a flat plate collector. Explain its working.	5	KTUApril 2018
4	With the aid of a neat diagram, explain the working of a central tower collector type solar thermal electric plant.	5	KTUApril 2018
5	Explain the principle, working and components of a solar flat plate collector. What is solar constant? Explain.	7	KTUDec2017
6	Define the terms solar constant, solar altitude angle and solar azimuth angle?	5	KTUApril 2018
7	Describe construction and working of a Pyranometer. What are the factors which affect the performance of a solar thermal collector	9	KTUDec2018
8	Define i) declination angle ii) inclination angle iii) tilt angle iv) angle of incidence and v) zenith angle	5	KTUDec2018
9	Find the hour angle at the sunrise and the sunset on March 22 for a surface inclined at an angle of 200 facing south at New Delhi (280 35' N, 770 12' E).	6	KTUDec2017
10	Differentiate between flat plate collectors and solar concentrators and compare their performance based on concentration ratio, collector efficiency and temperature range.	6	KTUDec2018
11	Explain the principle of conversion of solar radiation into heat	5	

12	Explain the design, fabrication and performance of cylindrical parabolic collector.	5	

Module 3			
Sl No.	**Questions**	**Marks**	**KU/ KTU (Month/ Year)**
1	Draw the V-I characteristics of a solar cell and list out the factors affecting the electricity produced by a solar cell?	5	KTUDec2017
2	Compare different f51pes of solar cells with reference to their construction and (5) efficiency.	5	KTUDec2017
3	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	KTUDec2017
4	With the help of a schematic diagram describe the operation of a solar photovoltaic power plant	10	KTUApril 2018
5	A certain PV cell is illuminated with an irradiance of 1000 Wm'. If the cell is100 mm X 100 mm in size and produces 3 A at 0.5 V at the maximum power point. What is the conversion efficiency? What is maximum power point tracking?	5	KTUDec2017
6	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	KTUDec2017
7	A small household-lighting system is powered from a nominally 8 V (i.e, four cells at 2 V) storage battery having a 30 Ah supply when charged. The lighting is used for 4.0 h each night at 3.0 A. Design a suitable photovoltaic power system that will charge the battery from an arrangement of Si solar cells	10	
8	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	KTUApril 2018
9	Draw the V-I characteristics of a solar cell and list out the factors affecting the electricity produced by a solar cell?	10	KTUApril 2018

	Compare different types of solar cells with reference to their construction and efficiency.		
10	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	KTUApril 2018
11	Draw and Explain the equivalent circuit of a practical solar cell. Discuss the effect of temperature and insolation on the characteristics of solar cell	9	KTUDec2018
12	Draw the block diagram of a solar thermal electric plant and explain its working.	6	KTUDec2018

Module 4			
Sl No.	**Questions**	**Marks**	**KU/KTU (Month/ Year)**
1	List out any five merits and demerits of OTEC. Explain various types of tidal power plants.	10	KTUDec2017
2	Discuss the basic principle of OTEC. Describe a closed cycle OTEC with its advantages and disadvantages.	10	KTUDec2017
3	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.	10	KTUApr 2018
4	With the help of a schematic diagram describe the operation of a Open cycle OTEC System		
5	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	KTUDec2017
6	Explain the principle of tidal power generation. List the advantages and limitations of tidal power plant	9	KTUDec 2018
7	Compare the working of an open cycle, closed cycle and hybrid cycle OTEC plants with neat sketches	6	KTUDec 2018
8	What are the site selection criteria for OTEC? Draw the block diagram and explain the working of Anderson cycle based OTEC system. Explain how bio fouling	10	KTUApr 2018

	affects efficiency of energy conversion and how can it be minimized?		
9	Differentiate between ebb generation and flood generation in tidal plants	5	KTUDec 2018

Module 5			
Sl No.	**Questions**	**Marks**	**KU/KTU (Month/ Year)**
1	Discuss the factors affecting the wind speed at an area. List the advantages and disadvantages of wind energy conversion system	10	KTUDec 2018
2	Draw the block diagram of a wind energy conversion system and explain the parts and their functions.	6	KTUDec 2018
3	Derive the expression for power extracted from wind.	4	KTUDec 2018
4	Derive the expression forpower in the wind. Define the term capacity factor of wind power plant. Explain the lift and drag forces in wind and its importance in wind power generation	10	KTUApril 2018
5	Give the site selection criteria for wind plants and write a note on wind energy potential in India.	5	KTUApril 2018
6	Draw the block diagram of a typical wind energy conversion system and explain the working of wind power plant. Explain how wind power plants are classified. Explain vertical axis wind turbine with necessary diagrams..	10	KTUApril 2018
7	Discuss the different types of wind turbine rotors used to extract wind. Explain the terms solidity, pitch angle, tip speed ratio, cut-in speed and cut speed of wind turbine	10	KTUDec 2017
8	A multi-blade wind mill lifts $1.03m^3$ /h of water through a head of 28m when the wind speed is 3.3m/s. calculate the power coefficient if the rotor diameter is 4.5m, given that transmission efficiency =0.95 and pump efficiency =0.7	5	
9	Prove that the maximum wind turbine output can be achieved when Vd=1/3 Vu where Vd and Vu are down-	10	KTUDec 2017

	stream and up-steam wind velocity respectively. What is pitch control of wind turbine? Explain.		
10	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	KTUDec 2017

Module 6			
Sl No.	**Questions**	**Marks**	**KU/KTU (Month/ Year)**
1	With a neat diagram, explain the working of biogas plant. What are the components of a micro hydel power plant	10	KTUDec 2017
2	Explain the production of ethanol for biomass for fuel applications.	4	KTUDec 2018
3	Write brief notes on any three types of gasifiers used for biomass to fuel conversion. Draw the layout of a micro hydro project.	10	KTUDec 2018
4	Briefly describe about Fuel Cell Technology, Hydrogen Energy, Alcohol energy and Power from Satellite stations	10	KTUApril 2018
5	Explain how fuel cell works as a renewable energy source.	5	KTUApril 2018
6	Explain the design and selection of different types of turbines used for small hydro plants.	5	KTUApril 2018
7	Describe how energy is harnessed from satellite stations. Explain the how urban waste is converted into useful energy.	10	KTUApril 2018
8	Explain the process of anaerobic digestion of biomass into biogas. Draw the schematic diagram of a biodigestor	5	KTUApril 2018
9	Write notes on a)Fuel cell b)Small hydro resources c)Power from satellite stations d)Hydrogen energy	20	KU Dec 2015

	e)Alcohol energy		
10	With a neat schematic diagram, explain the biomass gasification based electric power generation system. Describe the working and constructional features of PEM fuel cell	10	KTUDec2017
11	Draw the schematic of a KVIC type of bio gas plant. Briefly explain the power generation from satellites.	10	KTUDec2018
12	Explain any one type of fuel cell.	5	KTUDec2018