QUESTION BANK

Subject: **ELECTRONIC COMMUNICATION**

Module-1			
Sl. No	**Questions**	**Marks**	**KU/KTU (Month/Year)**
1	Compare amplitude and frequency modulation in transmission	6	KU May 2014
2	With block diagram explain generation of double sideband carrier Am	10	KU Dec 2016
3	Expression for modulation index of Am signal and explain each term	4	KTU Dec2016
4	What is meant by over modulation?	4	KU-Nov2017
5	Expression for frequency modulated signal	10	KU-Nov2017
6	Different type of amplitude modulated system	10	KU-Nov2017
7	What are advantages and disadvantages of SSB systems	5	KU-Nov2017
8	Distinguish between high level and low level modulation	10	KU-Model question
9	Advantage of SSB transmissions	4	KU-Model question
10	Compare the characteristics of FM and am what is advantage of FM over AM	6	KU-Model Qn
11	Explain the advantages of FM over AM.	5	KU-Dec2018
12	What are the factors to be considered in selecting Intermediate Frequency?	5	KU-Dec2018
13	a) Calculate the percentage power saving for the SSB signal if the AM wave is modulated to a depth of (a) 100% and (b) 50% b) With the help of block diagram, explain filter method for the generation of SSB AM.	10	KU-Dec2018
14	a) Describe the frequency spectra of SSB and VSB signals.	10	KU-Dec2018

	b) With neat circuit diagram, explain the operation of Balanced slope detector		
15	When do you prefer VSB signals to SSB. Why	5	KTU MAY2019
	Module 2		
1	Draw and explain the block diagram of high level and low level AM transmitter	4	KU May 2014
2	Explain the working of Foster Seely discriminator with the help of neat circuit diagram and relevant vector diagram	10	KU May 2014
3	With neat block diagram explain super heterodyne receiver. Mention the Functions of each block	10	KU May 2014
4	Describe the working of peak detector circuit with relevant figures How is heterodyning method different from multiplication method	10	KU May 2014
6	Describe the necessity of AFC loop with reference to direct FM transmitter?	4	KU May 2014
7	Mention advantages of Foster Seely discriminator over balanced slope detector	10	KU Dec 2016
8	With block diagrams explain the working of Amstrong FM transmitter	10	KU Dec 2016
9	Explain the factors to be considered for the selection of IF	4	KU Dec 2016
10	What are the applications of low level AM transmitter? With the help of block diagram explain its operation in detail	10	KU Nov 2017
11	Draw the block diagram of a super heterodyne AM receiver. Describe its operation stating the primary functions of each stage	10	KU-Dec2018
	Module 3		
1	Explain block diagram of monochrome TV receiver	10	KU May 2014
2	Sketch and explain composite video signal and mention the necessity of synchronizing and blanking pulses	10	KU May 2014
3	Write note on HDTV	10	KU May 2014

4	Explain interlaced scanning procedure in TV transmission. Mention its advantage	10	KU May 2014
5	Explain the principal of RADAR and its application	10	KU Dec2016
6	With schematic of black and white picture tube explain working	10	KU Dec2016
7	What is need of sync.pulses in TV signal	10	KU Dec2016
8	Mention different TV standards and the frequency bands used for TV signal transmission	10	KU Dec2016
9	Briefly discuss radar performance factors	10	KU Nov2017
10	How is colour transmitted in colour TV system	10	KU Nov2017
11	Explain the features of interlaced scanning.	5	KU-Dec2018
12	a) Draw the block diagram of a pulsed radar system. Explain the functions of each block. b) Explain with the help of a neat sketch, the working of a TV picture tube.	10	KU-Dec2018
Module 4			
1	Explain PCM used in digital communication	10	KU May 2014
2	Briefly explain what is meant by quantizing	10	KU May 2014
3	Explain basic principle of pulse code modulation	4	KU Dec2016
4	What is meant by aliasing	4	KU Dec2016
5	State and explain sampling theorem	4	KU Nov2017 ,4
6	With the help of necessary diagram explain process in PCM	10	KU Nov2017
7	List out the basic pulse modulation technique and explain anyone in detail	10	KU Nov2017 ,
8	Describe the generation and demodulation of PAM	10	KU May 2010
9	Describe the generation and demodulation of PWM	10	KU May 2010
10	Describe the generation and demodulation of PPM KU	20	KU May 2010
11	Compare PAM,PPM,PWM	10	KU –May 2014
12	Illustrate PWM and state the merits and demerits.	5	KU-Dec2018
13	Explain the schematic for PAM generation process using flat top sampling.	6	KU-Dec2018
14	Explain the block schematic for PCM generation process.	6	KU-Dec2018
15	Explain the principles of differential PCM system?	4	KU-Dec2018
Module 5			
1	What are Multiple access (MA) techniques		
2	FDMA, TDMA, CDMA, SDMA - applications in satellite communication		
3	MA techniques applications in wired communication		
4	MA techniques applications in satellite communication		

5	What are earth stations		
6	What are different types of fibers		
7	What are sources and detectors in fiber optic communication		
8	What are digital filters		
9	Explain with block diagram what is an optical link		
10	Give comparison between TDMA and FDMA	5	KU-Dec2018
11	Explain CDMA referred to satellite communication.	5	KU-Dec2018
12	Explain the major components in a fibre optic communication link with the help of block diagram.	5	KU-Dec2018
13	Explain the block diagram of an earth station used for satellite communication.	6	KU-Dec2018
14	What are the advantages of optical fibre communication?	4	KU-Dec2018
15	Explain any two detectors used in optical fibre communication	6	KU-Dec2018
	Module 6		
1	Explain the need of cell splitting and frequency rescue in cellular communication		KU May 2014
2	Describe the stages involved in hand off procedure. Also differentiate between soft and hard handoff		KU May 2014
3	Explain a))Sectoning b)Dualisation KU May 2014 ,10Marks		KU May 2014
4	Draw the block diagram of analog cellular transceiver		KU Dec2016
5	Explain various interferences associated with cellular communication	4	KU Dec2016
6	Explain handoff in cellular communication	4	KU Dec2016
7	What is meant by frequency reuse in mobile communication	4	KU Dec2016
8	List out the two-way mobile communication services		KU Nov2017
9	Explain the concept of frequency reuse.	5	KU-Dec2018
10	Explain the concept of Cellular approach Frequency reuse Cell splitting Frequency reuse Cell splitting		KU Nov2017
11	Describe the components of cellular system layout		KU Nov2017
12	Identify any three features of Bluetooth and explain how does it benefit for wireless applications	5	KTU DEC2018
13	Explain cell splitting technique.	5	KTU DEC2018

14	Explain the networking capability of Zig-Bee?	4	KTU DEC2018
15	Explain how cell splitting improves the capacity.	5	KTU May2019

QUESTION BANK

EE403 :DISTRIBUTED GENERATION AND SMART GRIDS (S7 EEE)

Sl No.	QUESTIONS	Marks	Year
	Module 1		
1	Write notes on Integration of distributed generation to Grid	10	
2	Compare smart grid with conventional utility grid.	5	Dec 2018
3	Explain how the real and reactive powers are controlled in a power electronic inverter based energy source.	5	Dec 2018
4	Briefly explain the Concepts of Micro Grid	10	
5	What are the Typical Microgrid configurations	10	
6	Differentiate AC and DC micro grids	10	
7	Comment on Interconnection of Microgrids	10	
8	Describe Opportunities, challenges and benefits of Smart Grids.	10	
9	Draw and explain the typical configuration of an AC microgrid.	10	Dec 2018
10	Explain with diagram, the working of energy router based interconnecting frame work for the microgrid system?	7	April 2019
11	What is the function of Energy Management module in a microgrid configuration?	3	April 2019
12	With help of a neat sketch, explain a typical microgrid configuration.	6	April 2019
13	Discuss the factors which necessitate the development of smart grid technology?	4	April 2019
14	What is a microgrid? List the characteristics?	5	April 2019

	Module 2		
1	What is Combined heat and power (CHP) systems? What are Distributed energy resources	10	

2	Briefly explain with block diagram Solar photovoltaic (PV) systems	10	
3	Explain Wind energy conversion systems (WECS)	10	
4	What is the function of Central Controller (CC) and Microsource Controllers (MCs).	10	
5	Describe Load sharing through power-frequency control	10	
6	With the help of block diagrams, explain the classification and working of micro turbines.	10	Dec 2018
7	Explain the components of an Ultra capacitor. Mention its advantages and disadvantages.	5	Dec 2018
8	Explain the working flywheel energy storage (FES) system.	5	Dec 2018
9	Explain the merits and demerits of a solar PV plant	5	April 2019
10	Why conventional over current relays may slowly respond or fail to operate in stand-alone Microgrid with significant number of micro sources and power electronic interfaces? Justify.	5	April 2019
11	Explain the voltage control method in a microgrid with a Q-V diagram.	5	April 2019
12	Explain the load frequency control in micro grid with a P-f diagram.	5	April 2019

Module 3			
1	What are Protection issues for Microgrids?	10	
2	What is Islanding? Explain Different islanding scenarios	10	
3	Describe Major protection issues of stand-alone Microgrid	10	
4	Explain the Impact of DG integration on electricity market, environment, distribution system	10	
5	What are the major communication standards and protocols?	10	
6	Explain NIST Smart Grid Reference Architecture?	10	
7	What is a smart meter, used in smart grid? List the features.	5	Dec 2018
8	Explain the need for Phase Measurement Unit (PMU) in Grid Interconnection.	10	
9	Draw and explain the National Institute of Standards and Technology (NIST) Smart grid reference architecture. Explain its various domains.	10	Dec 2018

10	What do you mean by islanding of microgrid? List the different islanding scenarios in microgrid.	5	Dec 2018
11	Write a short note on the Plug in Hybrid Electric Vehicle Technology describing the architectures.	5	April 2019
12	What is a Phasor Measurement Unit(PMU)? How PMUs improve the operational efficiency of smart grid?	5	April 2019

Module 4			
1	Explain some of Smart energy efficient end use devices	10	
2	Describe Smart distributed energy resources	10	
3	Draw a typical Load Curves and explain its characteristics	10	
4	What are the objectives and methodologies in Load Shaping	10	
5	What is the importance of Energy management?	10	
6	What are the new objectives and challenges in Load shapping?	10	
7	Define demand response	10	
8	What is load shaping? What are its advantages?	5	Dec 2018
9	List any five key features of smart energy efficient end use devices.	5	Dec 2018
10	Explain in detail, the load shaping objectives and methodologies.	10	April 2019
11	Illustrate the role of technology in demand response.	6	April 2019
12	What are the challenges in implementing demand side management in smart grid?	4	April 2019
13	A power generating station has a connected load of 80MW and maximum demand of 52MW. The total energy generated annually is 90×106kWh. Calculate the demand factor and load factor.	5	April 2019

Module 5			
1	Define Advanced Metering Infrastructure (AMI).	10	
2	Describe the characteristics AMI?	5	Dec 2018

3	Describe Home Area Network (HAN)?	10	
4	What do you mean by Neighbourhood-Area Networks (NANs)?	10	
5	Write short note on the design considerations of Sensor and Actuator Networks (SANET)	5	Dec 2018
6	Explain the Substation Architecture with block diagram	10	
7	What is feeder automation? List and explain the different components of feeder automation?	10	Dec 2018
8	Explain with neat sketches the basic architecture of smart substation	7	Dec 2018
9	Enumerate various advantages of smart substation	3	Dec 2018
10	List various components of Advanced Metering Interface (AMI).	5	April 2019
11	Describe the challenges and benefits of Home Area Network (HAN).	5	April 2019
12	Explain with diagram, about IEC 61850 substation architecture.	5	April 2019
13	Write down the transmission protocol of IEC 61850.	5	April 2019
14	Explain the role of NAN in smart grid technology.	5	April 2019

Module 6			
1	Describe Cloud computing in smart grid	10	
2	What do you mean by Private, public and Hybrid cloud?	10	
5	List an explain various power quality issues with smart grid?	10	Dec 2018
6	What are the major Harmonic sources?	10	
7	Explain SMPS and its importance	10	
8	What are the different arcing devices & saturable devices	10	
9	Explain different Harmonic indices (THD, TIF, DIN, C – message weights)	10	
10	Describe Power quality aspects with smart grids	10	
11	How Cloud computing is useful in a smart grid?	5	Dec2018
12	Write short notes on Distortion Index (DIN)	5	Dec2018
13	Draw the cloud architecture of a smart grid.	5	April 2019

14	Briefly explain various harmonic indices.	10	April 2019
15	What are the various sources of harmonics in a smart grid?	5	April 2019

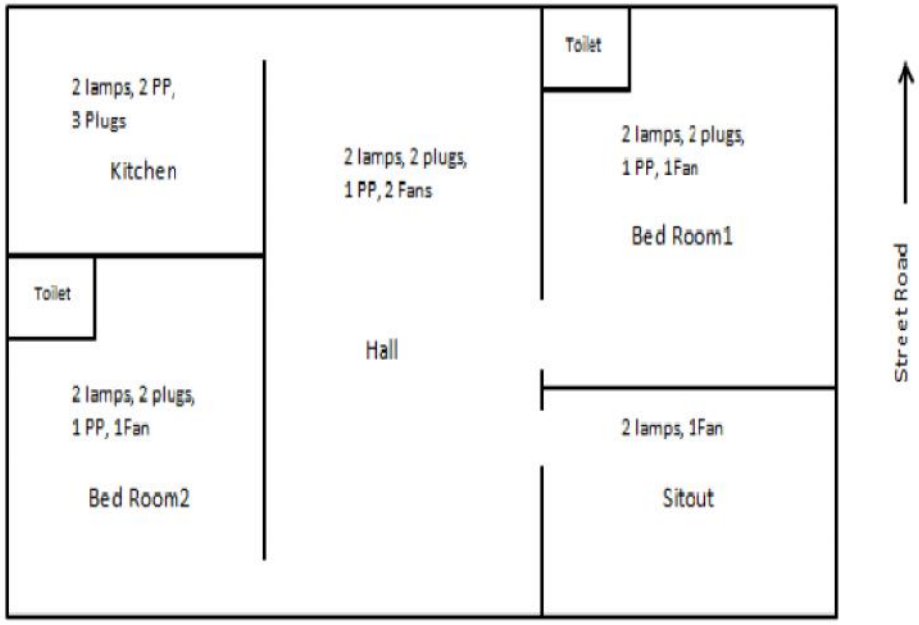
QUESTION BANK

Subject: Electrical System Design (EE 405) S7 EEE

Sl No.	Question	Marks	YEAR
	Module 1		
1	Why it is necessary to have pre-commissioning tests of electrical installations.	5	KTU May 2019
2	Mention the Scope of Indian electricity act 2003 in brief.	5	KTU Dec 2018
3	What are the relevance of IS 3043, IS 732, IS 2675, IS 5216-P12, IS 2309	10	
4	a) What are the steps to be followed for safety precautions against electric shock? b) Describe electric service in buildings.	10	KTU May 2018
5	State the Classification of voltages with standards and specification	6	KU June 2016
6	List the names of three major building services and three minor building services	10	
7	What are the major changes that has been brought about in Indian Electricity Act 2003?	5	
8	Discuss the role of NEC 2011 in Electrical systems design	10	KU June 2017

	Module 2		
1	What are the Pre-commissioning tests to be conducted during domestic installations?	5	KU June 2015
2	Specify a circuit breaker having both short circuit and overload protection. Explain its difference between MCB and ELCB.	5	KTU May 2019

3	a) What are different protective devices used in domestic installation? Explain each one in detail. b) Describe the selection procedure for ELCB for domestic and industrial dwelling.	10	KTU May 2019
4	The details of a residential building are given. Dining cum Drawing room – 8m x 4m, Bedroom (3 nos) - 4m x 4m, kitchen -4m x 3m, Work area - 4m x 2m,Toilet (3 nos.attached) - 1.5 x 2.5m,Office room-3m x 3m .Draw the lay-out, design and prepare the materials required for electrification using concealed conduit wiring system Assume missing data if any.	20	KU June 2017
5	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	20	KU May 2014
6	A residential building has the following loads. Design the electrical system for the building and draw the single line schematic diagram Number of light points 42 Number of power points 6 Ceiling fans 7 6A sockets 10 Room airconditioners-1.5T each Also, determine: 1. Connected load of the building and Maximum demand 2. Number of Light and Power circuits 3. Type of power supply required 4 Specification of the distribution board	20	CUSAT May 2017
7	Write short note on Air- Conditioning of residential building	5	
8	Explain the selection of main distribution board, sub distribution board, MCB, ELCB, MCCB and cables for sub circuits for domestic installation.	7	
9	What are the factors which decide the power distribution architecture in an electrical installation of an industry?	5	KTU Dec 2018

10	Design an electrical schematic for the residential building with following details. Locate the positions of meter board, Main Switch board, DB, switch boards.  	10	KTU Dec 2018

Module 3			
1	How is Industrial Installations classified?	5	
2	a) Design a wiring plan for installing a 75HP induction motor in an industry. b) How do you select the starter for the above Induction motor of 0.8pf, 75% efficiency? Explain.	10	KTU May 2019
3	A 10 hp three phase induction motor is to be installed in a workshop which is located 25m away from the main distribution panel board. Prepare an estimate of the quantity of materials required. Also show the layout of the wiring.	10	KU May 2014
4	Design a substation suitable for a thickly populated area with an 11kV/433V, 400 kVA transformer. The LT panel consists of six outgoing feeders' 200A two numbers, 100A two numbers and 63 A two numbers of capacity.Draw the single line schematic diagram with all protective devices. Also prepare list of materials required.	20	
5	A small industry has the following connected load. i. 7.5kW, 415V, three phase IM 1No	20	KU June

	ii. 3.7kW, 415V.three phase IM 3Nos iii. 2.2kW, 415V, three phase IM 3Nos iv. 0.735W, 240V, single phase IM 3Nos v. Lighting load consisting of 15Nos 2x40W fluorescent fixtures, 6Nos, ceiling fans, 6Nos 6A socket points, 3Nos 16A power socket points and 3Nos, 300mm Sweep exhaust fans. Prepare a schematic wiring diagram for the industry. (Specify the type of Industry) Design the sizes of the incoming and outgoing switch fuse units of the switch board and the starting devices for the motors		2015
6	Draw the single line diagram of an indoor substation showing all accessories of the system	5	
7	A 37kW/50HP, 415 V, three phase squirrel cage motor is having a blocked rotor kVA/HP of 6 and a blocked rotor power factor of 0.35. If the motor is started with a DOL starter, determine the percentage voltage drop at starting. Also determine the maximum number of starts permitted per hour based on the voltage flicker curve	20	
8	Draw the single line diagram of a transformer substation of 400 kVA, 11 kV/ 415 V, dry type transformer. Specify the rating of each unit at the primary and secondary side of the transformer with proper justification.	10	KTU Dec 2018
9	a) What are the advantages and disadvantages of an outdoor type substation over an indoor type substation? b) What are the classifications of the substations according to its functions?	10	KTU May 2019

Module 4			
1	Describe a procedure for selection of cables and methods of cables glanding	5	
2	Design an earthing system for an industry having 11KV/433V substation transformer is of 1MVA,7% of reactance and a line reactance of 2ohm.Assume fault level of 200MVA for HV side. soil resistivity is 50ohm-meter	10	KU May 2014
3	What are the permissible values of reactance of earth for large power stations and domestic installations?	10	KU June 2017
4	a) How do you design an earth mat in substation? Explain its importance.	10	KTU May 2019

	b) What are most common test in UG cables? Explain.		
5	Design the earthing system for an industry having a 11kV/433V, 2 MVA transformer with 6% reactance. The industry is fed from a grid substation 3km away by overhead line conductors of 84.1 sq.mm Al (Grasshopper) section and 1m spacing. The fault level at the grid substation is 250MVA. Assume earth resistivity at the transformer location as 70 ohm.m.	10	
6	What are the pre-commissioning tests to be conducted on a transformer?	10	
7	What is the significance of short circuit level in designing the earthing system for a transformer substation?	10	
8	What are the pre-commissioning tests to be conducted on cables?	10	

Module 5			
1	What are the requirements of a good artificial lighting scheme?	5	KTU June 2018
2	Write short note on energy efficient lamps	5	KTU June 2018
3	What you do mean by flood lighting? List out the requirements of a good flood lighting scheme used for a football stadium	10	KTU June 2018
4	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.	15	KU June 2018
5	What are the main factors to be considered while designing street/ road lighting?	10	KTU June 2018
6	a) Explain rising mains and rising buses in high rise buildings. b) Explain the various design parameters taken into consideration while designing street lighting and flood lighting.	10	KTU May 2019
7	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	10	KTU Dec

<table>
<tr><td></td><td>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</td><td></td><td>2018</td></tr>
<tr><td>8</td><td>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

<table><tr><th>Details</th><th>HPSV</th><th>LPSV</th></tr><tr><td>CU</td><td>0.60</td><td>0.55</td></tr><tr><td>LLF</td><td>0.75</td><td>0.9</td></tr></table>
The available lamp details are
Determine the layout of the lighting scheme with the wattage of lamps required</td><td>15</td><td></td></tr>
</table>

<table>
<tr><th colspan="4">Module 6</th></tr>
<tr><td>1</td><td>Explain the rules for selection of standby generator set</td><td>10</td><td></td></tr>
<tr><td>2</td><td>Explain the energy conservation techniques in lighting and power</td><td>10</td><td></td></tr>
<tr><td>3</td><td>a) Explain with suitable line diagram, how standby generators can include in existing electrical supply system. Assume HT consumer connection.

b) Write short notes on generator installation and its protection.</td><td>10</td><td>KTU May 2019</td></tr>
<tr><td>4</td><td>Define the function of AMF panel in electrical supply system</td><td>5</td><td>KTU Dec 2018</td></tr>
<tr><td>5</td><td>Explain the procedure for the initialization of Solar PV systems for domestic applications</td><td>10</td><td></td></tr>
<tr><td>6</td><td>What are the factors affecting the initialization of Solar PV systems for domestic applications</td><td>10</td><td></td></tr>
<tr><td>7</td><td>Explain Continuous, prime power and standby power</td><td>10</td><td></td></tr>
<tr><td>8</td><td>What are the various energy conservation techniques imposed in buildings?</td><td>5</td><td>KTU May 2019</td></tr>
<tr><td>9</td><td>a) What is energy conservation techniques imposed in buildings? Mention its necessity. (5) b) Distinguish between continuous power, prime power</td><td></td><td>KTU May</td></tr>
</table>

	and standby power related with standby generator.		2019

QUESTION BANK

Subject : DIGITAL SIGNAL PROCESSING

Sl. No	Questions	Marks	KTU/KU (Month/Year)
	MODULE 1		
1	a) Explain, how DFT and IDFT can be expressed as Linear Transformation (3) b) b) Derive the relationship of OFT to Z-transform (3) c) c) Find the circular convolution of x[n] = {I, 2, -1, 3, 4} and h[n] = {2, -I, 4, 1, 3} (5) d) d) Explain overlap add method for filtering of long data sequences (4)	3,3,5,4 Marks	KU April 2013
2	a) Define Stable And Unable System? b)Define Discrete Time Signal? Define Dynamic And Static System? c)How to Obtain the Output Sequence Of Linear Convolution Through Circular Convolution?	2,6,7 Marks	KU April 2013
3	a) Difference between DFT and DTFT. What is the convolution? b) b).What is SISO system and MIMO system?	10	
4	. Find the convolution of the signals x(n) = 1 n=-2,0,1= 2 n=-1= 0	10	KU May 2015
5	Detemine the solution of the difference equationy(n) = 5/6 y(n-1) – 1/6 y(n-2) + x(n) for x(n) = 2nu(n)	10	
6	Find the 4 point DFTs of two sequences g(n) and h(n) defined below, using a single 4 point DFT. g(n)={1,2,0,1} and h(n)={2,2,1,1}.	10	KU April 2018
7	Prove if x(n) is a real valued sequence, then its DFT X(K) =X* (N-K).	10	KU May 2015
8	a) Show that, if x[n] is a real and even sequence, then its OFT X[k] is also real and even b) Find linear convolution of x[n] = {2, 3, -I} and h[n] = {I, -I, 2}, using circular convolution. c) Find the number of complex multiplications involved in the calculation of a 1024 point DFT using (i) direct computation(ii) radix-2 FFT algorithm d) Explain, how N point DFTs of two real-valued sequences can be found by computing a single N point OFT.	3,5,3,4 Marks	KTU Dec 2016
9	Determine the response y(n), n>=0 of the system described by the second order difference equation y(n)– 4y(n-1) + 4y(n-2) = x(n) – x(n-1) when the input is x(n) = (-1)nu(n) and the initial condition are y(-1) = y(-2)=1	10	KU April 2014

10	a) Find the convolution of the signals x(n) = 1 n=-2,0,1= 2 n=-1= 0 elsewhere b) Show that the discrete time system described by the input-output relationship y[n] = n x [n] i s l i n e a r ?	10	KU May 2015
	MODULE-2		
1	. a) Find 8 point OFT of x[n] = {2, I, -I, 3, S, 2, 4, I} using radix-2 decimation in time (11) FFT algorithm b) Explain, how a 2N point DFT of a 2N point real-valued sequence can be found by (4) computing a single N point OFT	15 Marks	KU April 2015
2	a) How many multiplication terms are required for doing DFT by expressional m e t h o d a n d F F T m e t h o d expression – N /2 log N b) Find the DIF FFT of x[n]={1,1,1,1,0,0,0,0} c) Find the DIF FFT of x[n]={1,4,1,4,0,4,0,2}	10	KU April 2013
3	a).State the properties of DFT. b) Define DFT and IDFT (or) What are the analysis and synthesis equations of DFT? c) .How to obtain the output sequence of linear convolution through circular convolution?	10	KTU Dec 2016
4	a) What is zero padding?What are its uses? b) .Define sectional convolution. c) What is overlap-add method?	10	KU April 2013
5	a) What is overlap-save method? b) What are the applications of FFT algorithm? c) What are differences between overlap-save and overlap-add methods.	8	KTU Dec 2017
6	Derive the DFT of the sample data sequence x(n) = {1,1,2,2,3,3}and compute the corresponding amplitude and phase spectrum	10	KU April 2013
7	Given x(n) = {0,1,2,3,4,5,6,7} find X(k) using DIT FFT algorithm	10	KTU 2017
8	Given X(k) = {28,-4+j9.656,-4+j4,-4+j1.656,-4,-4-j1.656,-4-j4,-4-j9.656} ,find x(n)using inverse DIT FFT algorithm.	10	
9	Find the inverse DFT of X(k) = {1,2,3,4}	8	
10	Derive the DFT of the sample data sequence x(n) = {1,1,1,2,2,3,3,2}and compute the corresponding amplitude and phase spectrum	10	KU April 2013
	MODULE 3		
1	Distinguish between FIR filters and IIR filters.	10	

2	What are the design techniques of designing FIR filters? What is Gibb's phenomenon?	10	KTU Dec 2016
3	List the steps involved in the design of FIR filters using windows.	10	KU May 2015
4	a) Prove that, if z! is a zero of a linear phase FIR filter, then liz! is also a zero. *(S)* b) Design a linear phase FIR low pass filter having length M = IS and cut-off (10) frequency COc = *1£16.* Use Hamming window.	15	KU April 2013
5	a) Explain the design of linear phase FIR filters by the frequency sampling method. (9) b) Explain the frequency transformations in the analog domain (6)	15	KU May 2015
6	Find the transfer function of the realizable filter (N-1)/2H(z)=z-(N-1)/2 [h(0)+∑ h(n)(z^{n}+z^{-n})]n=0	10	KU 2017
7	What are the desirable characteristics of the window function?	5	KTU Dec 2016
8	Give the equations specifying the following windows. a. Rectangular window b. Hamming window c. Hanning window d. Bartlett window e. Kaiser window	10	
9	a)What is the necessary and sufficient condition for linear phase characteristic in FIR filter? (10) b) What is the principle of designing FIR filter using frequency sampling method?	10	KU April 2013
	MODULE 4		
1	. Design a digital Butterworth low pass filter with cop = *1£16,* COs = *1£14,* minimum *(15)* pass band gain = -2dB and minimum stop band attenuation = 8dB. Use bilinear transformation. (Take T = 1)	15	KTU Dec 2016
2	a) Write the steps in designing chebyshev filter? b).Write down the steps for designing a Butterworth filter? c).State the equation for finding the poles in chebyshev filter	10	KU May 2015
3	a)What is the reason that FIR filter is always stable? b) Under what conditions a finite duration sequence h(n) will yield constant group delay in its frequency response characteristics and not the phase delay? c)When cascade from realization is preferred in FIR filters?	10	KTU Dec 2016
4	a) Find the DFT of a sequence x(n)={1,2,3,4,4,3,2,1}using	10	KU April 2013

	radix-2 DIT algorithm. b) Find the IDFT of the sequence X(K)= {10,-2+2j,-2,-2-2j}.		
5	In an LTI system the input sequence x(n)={1,1,1}and the impulse response h(n)={-1,1}.Find the response of the LTI system by using DFT –IDFT method	10	KU May 2015
6	Derive the time reversal property of DFT.	5	
7	Design an analog Butterworth filter that has a 2dB pass band attenuation at a frequency of 20 rad/sec and at least 10dB stop band attenuation at 30rad/sec	10	KTU Dec 2016
MODULE 5			
1	a) Find the lattice structure implementation of FIR filter h[n] = {I, 0.5, 0.75, -0.6} (6) b) Draw the direct form II structure and transposed direct form II structure of He) *1+0.5z-1-O.75z-2* *Z = 1+0.6z-1+O.4z-2-O.2z-3* (5) c) Draw the block diagram of TMS320C67XX and briefly explain the function of eachblock (9)	20	KU May 2015
2	a) Draw the direct form realization of linear phase FIR filter h[n] = {I, 0.5, 0.25, -0.5, 0.8, -0.5,0.25,0.5, I} using minimum multipliers. b) Draw the signal flow graphs of direct form IT and cascade form structures (5) H(e) *(0.8+0.2z-1+O.6z-2)(1-0.6z-1)*of *z* = (1-0.6z-1+O.8z-2)(1+0.8z-LO.7z-2) (5) c) Explain the effects of coefficient quantization in ITR and FIR filters. (10)	20	KTU Dec 2016
3	Given X(k) = {1,1,1,1,1,1,1,1,} ,find x(n) using inverse DIT FFT algorithm	5	
4	Consider the transfer function H(Z)=H1(Z)H2(Z) where H1(Z) =1/1-a1Z-1H2(z) =1/ 1-a2Z-1Find the o/p Round of noise power Assume a1=0.7 and a2= 0.8and find o/p round off noise power	10	KU April 2013
5	Design a filter with H d (e^{jw})=e^{j3w} ,$-\pi/4 \le w \le \pi/4$ 0 ,$\pi/4 < |w| < \pi$ Using Hanning window with N=7 .	10	KU May 2015
6	Explain the relevance of window function and explain each window	15	KU May 2015
7	. a) For the constraints $0.8 \le |H(e^{jw})| \le 1$, $0 \le w \le 0.2\pi$ $|H(e^{jw})| \le 0.2$,$0.6\pi \le w \le \pi$	10	KTU Dec 2016

	With T=1sec.Determine system function H(z) for a Butterworth filter using impulse invariant method.		
8	Explain the bilinear transformation method of IIR filter design	10	
	MODULE 6		
1	Obtain the direct form I, direct form II, cascade and parallel form realization for the system $y(n)=-0.1y(n-1)+0.2y(n-2)+3x(n)+2.6x(n-1)+0.6x(n-2)$.	10	KU April 2013
2	Filter is given by the system function $H(z)=1+ (1/3)z^{-1} +(1/4) z^{-2} +(1/4) z-^{3}+(1/3) z^{-4} + z^{-5}$. Implement the filter with minimum number of multipliers. will the filter have linear phase characteristics?	10	KU May 2015
3	What are the factors involved with finite word length effects in digital filters. Explain any two effects in detail.	10	KTU Dec 2016
4	Find the steady state variance of the noise in the output due to quantization of input for the first order filter y(n)=ay(n-1)+x(n).	10	KU May 2015
5	a) Give the output of decimation by M system in time domain. Explain output frequency spectrum. What is the importance of low pass filtering prior to downsampling? (10) b) How does a floating-point number represented in a processor? Explain the operations of addition and multiplication of two floating point numbers with examples. (5) c) Derive the variance of quantization noise in ADC with step size fl. (Assume quantization noise has uniform distributed pdf with zero mean) (5)	20	KTU Dec 2016
6	The output signal of an A/D converter is passed through a low pass filter with transfer function is given by H(z)=(1-a)z/(z-a) for 0<a<1.Find the steady state output noise power due to quantization at the output of the digital filter	12	KU April 2013
7	List out any two features of a fixed point processor that distinguishes it from a floating point processor.	10	KU May 2015

EMD QUESTION BANK

Name of the Staff: Sabna M

MODULE I

1	Examine the different types of ventilations in electrical machines. b) Derive the gap contraction factor for slots.	4	DEC 2018
2	List five types of enclosures used in electrical machines.	5	DEC 2018
3	Derive the gap contraction factor for slots.	6	DEC2018
4	Explain the procedure to calculate MMF for air gap and teeth in an electrical machine.	5	DEC 2018
5	What is meant by hot spot rating in electrical machines?	5	MAY 2019
6	Compare the reluctance of slotted armature with that of smooth armature surface.	5	MAY 2019
7	Examine any four components of armature leakage flux.	4	MAY 2019
8	Derive the relation between real and apparent flux densities	6	MAY 2019
9	Explain unbalanced magnetic pull in rotating electrical machines.	5	MAY 2019
10	Explain theproperties and applications of magnetic materials used in electrical machines.	4	DEC 16
11	Explain the different types of ventilation systems used in electrical machines.	6	May 16
12	Derive the relation between real and apparent flux density in highly saturated armatures teeth.	6	DEC 16

MODULE II

1.	Derive the output equation of a single phase core type	5	DEC 2018

	transformer.		
2.	Derive the volt per turn equation of a single phase transformer.	5	DECEMBER 2018
3.	Determine the dimensions of core and yoke for a 100KVA 50Hz single phase core type transformer. A square core is used with distance between the adjacent limbs equal to 1.6 times the width of laminations. Assume Emf/turn14V, Maximum flux density 1.1 Wb/m2, current density 3 A/mm2, window space factor 0.32, and stacking factor 0.9. Flux density in the yoke to be 80% of flux density in the core.	10	DECEMBER 2018
4.	Derive the output equation for 3 phase core type transformer.	4	MAY19
5.	Determine the dimensions of core and yoke for a 200KVA 50Hz single phase core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times width of core laminations. Assume voltage per turn 14 V, maximum flux density 1.1Wb/m2, window space factor 0.32, current density 3A/mm2 and stacking factor 0.9. The net iron area is 0.56d2 in a cruciform core where d is the diameter of circumscribing circle and width of largest stamping is0.85d.	6	MAY19
6.	Derive the ratio of gross core area to area of circumscribing circle for a square core of a transformer.	5	MAY19
7.	Derive the ratio of gross core area to area of circumscribing circle for a square core of a transformer.	5	MAY19

8.	What are the different types of transformer cross sections?	5	
9.	A transformer has a final steady temperature rise of 75°C at full load and a heating time constant of 3 hr. The copper loss at full load is twice the iron loss. Calculate the temperature rise of the transformer at the end of the following load cycle after starting from load 11/ 2 hr 25% overload 1 hr.	10	DEC 16
10.	Derive the output equation of a 3 phase transformer	5	MAY16
11.	Determine the main dimensions of the core, no. of turns and the cross section of the conductors for a 5 kVA, 11000/400 V, 50 Hz, single phase core type distribution transformer. The net conductor area in the window is 0.6 times the net cross section of iron in the core. Assume a square cross section for the core, a flux, density 1Wb/m2, a current density 1.4 A/mm2 and window space factor 0.2. The height of window is 3 times its width.	12	DEC 16
12.	Calculate the main dimensions and winding details of a 100 KVA, 2000/400V, 50Hz, single phase shell type, oil immersed, self cooled transformer. Assume,Voltage/turn =10 Flux density in core = 1 Wb/m2,Current density = 2A/mm2 , Window space factor = 0.35,Ratio of height to width of window = 3,Ratio of core depth to width of central limb = 2.5.	10	MAY16
	MODULE III		
1.	Define specific magnetic loading? Explain the factors	5	Dec 18

	need to be considered for choice of specific magnetic loading in a dc machine		
2.	Explain in steps how to separate D and L for a DC machine?	3	Dec 18
3.	b) Find out the main dimensions of a 50kW, 4 pole, 600 rpm DC shunt generator to give a square pole face. The full load terminal voltage being 220 V. The maximum gap density is 0.83 Wb/m2 and the ampere conductors per meter is 30000. Assume that full load armature voltage drop is 3 per cent of rated terminal voltage and that the field current is 1 per cent of rated full load current. Ratio of pole arc to pole pitch is 0.67.	7	Dec 18
4.	Explain the design procedure of interpoles in DC machines?	5	DEC 18
5.	Derive the output equation of DC machine.	5	MAY 19
6.	Explain step by step design procedure of brushes and commutator in a DC machine.	5	MAY19
7.	Explain step by step design procedure for armature of a dc machine	5	MAY19
8.	Find the main dimensions of a 100 MVA, 11kV, 50 Hz, 150 rpm,3 phase water wheel generator. The average gap density is 0.65 Wb/m2 And the ampere conductors per meter is 40000.The peripheral speed should not exceed 65m/s at normal running speed in order to limit the runaway peripheral	10	MAY19

	speed. Assume the winding factor to be 0.955.		
9.	Determine the main dimensions of a 45kW, 220V, 850 rpm, DC motor, given Average flux density = 0.5 Wb/m2,Ampere conductors/m = 26,000,Maximum efficiency = 90% on full load. Field current is 2.5% of full load current.	10	DEC 16
10	A 150 kW, 6 pole, 230 V, 500 rpm, dc short motor has an efficiency of 91%. Design the main dimensions, no. of slots, no. of conductors and dimensions of slot. The following data are available. Specific magnetic loading = 0.6, specific electric loading = 29 kA/m.	10	MAY16
	MODULE IV		
1.	Distinguish between cylindrical pole and salient pole construction.	3	DEC 18
2.	Write short notes on (i) Short circuit ratio (ii) Run away speed.	5	DEC 18
3.	Determine the main dimensions of a 2500 kVA 187.5 rpm, 50Hz 3 phase 3kV, salient pole synchronous generator. The generator is to be a vertical, water wheel type. The specific magnetic loading is 0.6 wb/mm2 and the specific electric loading is 34000A/m. Use circular poles with ratio of core length to pole pitch= 0.65. Specify the type of pole construction used if the runaway speed is about 2 times the normal speed.	7	DEC 18
4.	Determine the main dimensions of a 500 kVA, 50Hz 3 phase alternator to run at 375 rpm. The average air gap	5	DEC 18

	flux density is 0.55wb/mm2, the specific electric loading is 25000A/m. The peripheral speed should not exceed 35m/sec.		
5.	Explain different types of cooling systems used in synchronous machines.	5	MAY 19
6.	Find the main dimensions of a 2500 kVA, 187.5 rpm, 50 Hz, 3 phase, 3 kV, salient pole synchronous generator. The generator is to be vertical, water wheel type. The specific electric loading is 34000 A/m and Bav is 0.6 Wb/m2. Use circular poles with ratio of core length to pole pitch to be 0.65. Specify the type of pole construction used if the run-away speed is about 2 times the normal speed.	10	MAY 19
7.	Derive the output equation of an alternator.	4	
8.	Explain step by step design procedure for field winding of synchronous machine.	10	DEC 16
11	Determine the main dimensions for a 1000 kVA, 50 Hz, 3 phase, 375 rpm alternator. The average air gap flux density is 0.55 wb/m2 and the ampere conductors/metre are 28,000. Use rectangular poles and assume ratio of core length to pole pitch as 2.	10	DEC 16
	MODULE V		
1.	How do you separate ‘D’ and ‘L’ from the volume D^2 L of a 3 phase induction motor?	5	Dec 18
2.	Explain the rules for selecting number of rotor slots in a three phase induction motor.	5	Dec 18

3.	With all details of the various parameters including the units derive the output equation of a 3 phase squirrel cage induction motor.	5	Dec 18
4.	Design the main dimensions of a 25 kW, 3 phase, 415V, 50 Hz, 1475 rpm squirrel cage induction motor having an efficiency of 85 % and full load power factor of 0.86. Assume Bav = 0.5T, ac = 28000A/m. The rotor peripheral velocity is 25 m/s at synchronous speed.	5	Dec 18
5.	Explain the procedure for separation of D and L from ^{D2L} product while Designing induction motors.	5	Dec 18
6.	List out and explain the factors to be considered for selection of specific electric loading in 3-phase induction motors.	5	MAY19
7.	State the main constructional differences between cage induction motor and slip ring induction motor.	5	MAY19
8.	Design the main dimensions of a 25 kW, 3 phase, 415V, 50 Hz, 1475 rpm squirrel cage induction motor having an efficiency of 85 % and full load power factor of 0.86. Assume Bav= 0.5T, ac = 28000A/m. The rotor peripheral velocity is 25 m/s at synchronous speed.	5	MAY19
9.	How do the iron losses affect selection of Bav? (5)	5	MAY19
10	Explain cogging and crawling in 3-phase induction machines.	5	MAY19
11	Explain the steps involved in designing rotor bar and end	5	MAY 16

	rings of an induction motor.		
	MODULE VI		
1.	What is meant by discretization in finite element method?	5	DEC 18
2.	Explain the hybrid techniques available for computer aided design.	5	DEC 18
3.	Explain how finite element method is used for analysis of electrical machines.	6	DEC 18
4.	List out the advantages of FEM based methods over conventional design	4	DEC 18
5.	What is computer aided design? How does it help in designing electrical machines?	5	DEC 18
6.	Explain synthesis method for computer aided design of electrical machines	5	MAY 19
7.	Explain on few software's used for designing electrical machines?	5	MAY 19
8.	Explain on Analysis method of solving electrical machine using CAD with a flow chart.	6	MAY 19
9.	What are the advantages of analysis method?	4	MAY 19
10	Explain the steps involved in the computer aided design and analysis of Electrical machines.	5	MAY 19
11	Write a simple program based on Induction machines	10	MAY 16

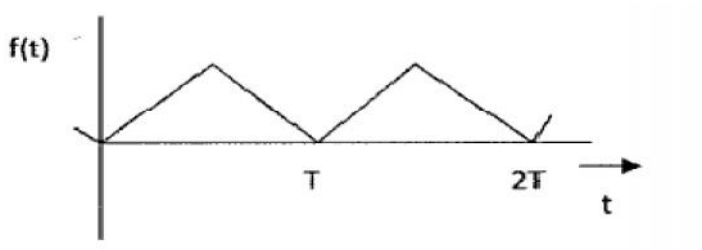
QUESTION BANK

S7 EEE

Subject: (EE 465) POWER QUALITY

Sl No.	Question	Marks	
	Module I		
1	Define power quality and types of power quality disturbances?	5	KU
2	Why power quality has become an issue in recent years?	5	KTU'18
3	Define a) Voltage sag. b) How do you classify the voltage sag? c) What are the usual causes for producing voltage sag?	7	KU
4	Differentiate between linear loads and non-linear loads with suitable examples?	5	KTU'18
5	Write a short note on a) Short duration voltage variation b) Long duration voltage variation?	10	KU
6	Explain the different Sources and Effects of power quality problems?	6	KU
7	Why we are concern about power quality? Discus the effect of sag on instruments?	7	KU
8	Explain waveform distortions and voltage flicker?	10	KU
9	What are the disturbances coming under the term "waveform distortion"? Explain each one them with neat figures	10	KTU'18
10	What is meant by voltage sag and voltage swell as per IEEE standard?	5	KTU'18
11	Voltage sag and interruption are very similar in nature. Justify the statement?	10	

Module II			
1	Explain the mechanism of harmonic generation?	5	KU
2	Write a note on harmonic indices a) THD b) TID c) TIF d) C message Weights	10	KU& KTU'18
3	How we can evaluate power quality costs?	5	KU
4	What are the major effects of Power System harmonics on Power System equipment and loads?	5	KU
5	Explain the effects of harmonics in power system devices?	5	KU
6	Explain the different harmonic sources?	5	KU
7	Write a note on Switching devices, arcing devices, saturable devices	6	KU
8	Explain various standards of power quality	5	KU
9	Find the THD value of a voltage waveform with the following harmonic Fundamental $=V_1 = 114V$ Third harmonic $= V_3 = 4V$ Fifth harmonic $= V_5 = 2V$ Seventh harmonic $= V_7 = 1.5V$ Ninth harmonic $= V_9 = 1V$	5	KU& KTU'18
Module III			
1	How can we evaluate harmonics using FFT?	5	KU
2	Derive the expression of harmonic analysis in Fourier series analysis and Explain how Fourier series can be used for harmonic analysis?	10	KTU'18
3	Explain the Fourier transforms of harmonic analysis	5	KU
4	Explain the discrete Fourier transform of harmonic analysis?	5	KU
5	Define windowing. How window function can be used for harmonic analysis	5	KU& KTU'18
6	What are the few equipments, which contribute to harmonics in the	10	KU

	utility. Explain how and why do this happen?		
7	Find the amplitude of the 5th harmonic of given waveform. Peak value is unity.  	5	KTU'18
8	Differentiate Fourier series and Fourier transform	8	

	Module IV		
1	Explain briefly about the harmonic analysis of power quality?	5	KU
2	Explain the importance of power quality monitoring?	5	KTU'18
3	a) What are the common monitoring objectives? b) Explain the features for power line disturbance analyzer	10	KTU'18
4	What are the power quality measuring instruments? ..Explain any two with details?	10	KU
5	Explain with neat sketch harmonic spectrum analyzer	8	KU
6	a) What is meant by aliasing? b) Describe the concept of flicker meters?With the help of block diagram, explain in detail about the flicker meter	10	KTU'18
7	Describe the concept of disturbance analyzer?	5	KU
8	List the major power quality monitoring instruments	4	KU
	Module V		
1	How we can eliminate the harmonics .What are the necessary actions taken into account?	5	KU
2	What is the role of filters to reduce harmonic distortion?	8	KTU'18

3	Explain the concept of power conditioner?	5	KU
4	Design and plot the frequency response of passive filter	6	KU
5	Design and plot the frequency response active filter	6	KU
6	With neat diagram, Explain the operation of series active filter to improve power?	7	KTU'18
7	Design and plot the frequency response of shunt filter?	6	KU
8	Design and plot the frequency response hybrid filters	6	KU
9	Distinguish between active filter and passive filter?	5	KTU'18
10	With neat diagram, explain shunt passive filters?	5	KTU'18
Module VI			
1	What is smart grid?	4	KU
2	DefinePower Quality Management in Smart Grid	5	KU
3	Explain the Power Quality issues in Renewable Energy Sources?	8	KU
4	Define the major issues of Power Quality in Grid connected system	5	KU
5	Define the Power Quality Conditioners for Smart Grid?	10	KTU'18
6	Explain the Electromagnetic Interference in smart grid?	7	KU
7	What are the different classification of Electrical fields and Magnetic Fields?	8	KU
8	Explain the different EMI Terminology?	8	KTU'18
9	Explain the concept of Power frequency fields?	5	KTU'18
10	Explain the concept of High frequency in Power Quality Management in Smart Grid?	5	KU
11	Explain common mode rejection ratio and common mode noise	5	KTU'18
12	Distinguish between conducted and radiated emission?	5	KTU'18

ELECTRIC AND HYBRID VEHICLES			
Module 1			
Sl. No	**Questions**	**Marks**	**KU/ KTU (Month/ Year)**
1	Which are the resistive forces that retard the motion of a four-wheel vehicle? Show with a diagram.	5	KTU DEC 2018
2	What are the social and environmental impacts of hybrid vehicles?	4	KTU DEC 2018
3	Under what condition a pure EV can be chosen as a better option compared to hybrid vehicles considering the impact on climate change?	4	KTU DEC 2018
4	Explain rolling resistance and aerodynamic drag in vehicles.	5	KTU MAY 2019
5	What is meant by “gradeablity”? Explain.	4	KTU MAY 2019
6	A vehicle with power plant power output at the drivetrain considering all losses is 100kW. The maximum total resistance the vehicle experiences is 3.6 kN. Calculate the velocity the vehicle can achieve in km/h under this condition?	3	KTU MAY 2019
7	Derive the dynamic equations governing the motion of a vehicle.	10	
8	Differentiate between electric vehicle and hybrid electric vehicle.	4	
Module 2			
1	With the help of block diagram explain the major components of an electric vehicle.	5	KTU DEC 2018

2	a) Sketch the ideal torque-speed characteristics required for an electric/hybrid vehicle power plant. Identify the regions of operation.	4	KTU DEC 2018
	b) Explain the different power flow control modes of a typical parallel hybrid system with the help of block diagrams.	6	
3	Draw six different configurations of drivetrains in electric vehicles. Briefly explain each configuration.	6	KTU DEC 2018
4	Differentiate between complex hybrid and series parallel hybrid configurations.	6	KTU DEC 2018
5	With the help of a neat block diagram explain different subsystems of electric drive train	5	KTU MAY 2019
6	a) Why a gear system is needed for an ICE? Explain with relevant characteristic curves.	6	KTU MAY 2019
	b) Explain the EV drivetrain alternatives based on power source configuration.	4	
7	Explain the various power flow control modes for a series hybrid vehicle.	7	KTU MAY 2019
8	Explain the power flow control modes for a series-parallel hybrid vehicle.	6	KTU MAY 2019
Module 3			
1	How the electric motors used in EVs differs from that of used in industrial application?	5	KTU DEC 2018
2	Explain the forward motoring and regenerative (forward) braking control of a dc motor with a single chopper. Give circuit diagram, and show the quadrants of operation.	6	KTU DEC 2018
3	With the help of neat figures explain the general configuration of constant v/f control of induction motors.	6	KTU DEC 2018
4	What are the desired features of motors used for	4	KTU

	electric vehicles?		DEC 2018
5	Classify the electric motors drives for EV and HEV application.	5	KTU MAY 2019
6	Explain the four-quadrant chopper control of dc motor.	6	KTU MAY 2019
7	What is the advantage of AC motor over DC motors for EV applications?	5	KTU MAY 2019
8	Explain the configuration of v/f controlled induction motor drive with field-weakening mode and constant-torque mode.	6	KTU MAY 2019

Module 4			
1	Explain the terms specific energy and energy density as applied to batteries.	5	KTU DEC 2018
2	What are factors affecting the performance of batteries used in EVs?	4	KTU DEC 2018
3	a) Give the advantages and disadvantages of fuel cells	4	KTU DEC 2018
	b) What is meant by C – rating of a battery? If a 100Ah battery is rated C_5, what would be its discharge current expressed as $0.5C_5$?	6	KTU DEC 2018
4	Explain the terms specific power and energy efficiency of a battery.	5	KTU MAY 2019
5	Describe the terms State-of-Charge and Depth-of-Discharge as applied to batteries.	4	KTU MAY 2019
	What is meant by Peukert capacity of a battery? What	5	KTU

	is its significance?		MAY 2019
6	Explain the working principle of a fuel-cell.	4	KTU MAY 2019
7	Define the term hybridness	5	
8	Explain the terms specific power and specific energy of a battery	5	
Module 5			
1	With a sketch of the speed Vs. time characteristics, explain the operating regimes of a vehicle which decides the selection and sizing of its drivetrain.	5	KTU DEC 2018
2	Draw the schematic diagram of an epicyclic (planetary) gear set and show the parts.	5	KTU DEC 2018
3	Explain the terms Continuous rating, Intermittent overload operation, Peak overload operation related to electric machines used for HEV. How are these relevant to the selection/sizing of the propulsion motor in an HEV?	6	KTU DEC 2018
4	In a parallel hybrid electric vehicle (HEV) of hybrid-ness = 25%, has an electrical traction motor and an IC engine, both engine and motor shafts are inputs to a three-way transmission system with a total tractive power of 100kW. Assuming 95% efficiency, find the minimum size of battery in Ah, for a 20Hr drive cycle. Select battery voltage as 120V.	5	KTU DEC 2018
5	Explain briefly the electrical and mechanical constraints to be considered while sizing an electrical machine for a EV.	5	KTU DEC 2018
6	Explain the role of drive cycle for a city bus in designing the size of energy storage for electric vehicle.	5	KTU MAY 2019
7	What are the sizing constraints for the electric motor?	5	KTU MAY 2019

8	A hybrid electric vehicle has two sources- an ICE with output power of 80kW and battery storage. The battery storage is a 150 Ah, C10 battery at 120V. (i). Calculate the battery energy capacity (ii). Without de-rating the Ahr capacity, what is the maximum power that can be supported by the battery. (iii). What is the electrical motor power output if the total efficiency of power converter and motor combination is 98%. (iv). What is the maximum power that can be transmitted to the wheels if the transmission efficiency is 95%?	6	KTU MAY 2019
9	What is meant by Constant Power Speed Ratio as applied to an electric motor? What is its typical value for Induction Motors used in HEV applications?	5	KTU MAY 2019
10	Draw the typical torque Vs speed envelope curves of drivetrain motors and show the continuous, intermittent and peak overload ratings.	5	KTU MAY 2019
Module 6			
1	What are the important subsystems in an electric/hybrid vehicle?	5	KTU DEC 2018
2	What is power follower strategy for energy management in hybrids? Is this a rule based strategy or an optimization based strategy?	5	KTU DEC 2018
3	List four examples of rule based strategies that can be applied to energy management in hybrid vehicles.	4	KTU DEC 2018
4	What is a Controller Area Network?	5	KTU DEC 2018
5	What are the typical objectives a fuzzy logic based energy management control strategy addresses, and what inputs are mainly employed in the strategy?	5	KTU DEC 2018
6	What is the significance of a communication network in electric/hybrid vehicles? What are the functions of the in-vehicle communication network?	5	KTU MAY 2019
7	Why an energy management control system is required in an HEV? Do you think an elaborate energy	5	KTU MAY

	management system similar to that applied to a hybrid vehicle, is required in an electric vehicle? Explain.		2019
8	What are the advantages of fuzzy logic based energy management control strategy in hybrid vehicles?	4	KTU MAY 2019
9	Draw the block diagram of a general Fuzzy Logic Controller (FLC) and show the core components of the FLC and the inputs and outputs relevant to a hybrid electric vehicle control.	5	KTU MAY 2019
10	Explain fuzzy logic implementation of energy management system in a parallel HEV with induction motor and ICE with an objective of reduction in environmental pollution with the help of a block diagram.	5	KTU MAY 2019