

S8 QUESTION BANK Electronics & Communication Engineering (2019-23 Batch) Ac. Yr. 2022-23

DEPARTMENT OF ELECTRONICS & COMMUNICATION NGINEERING

VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY TECHNICAL CAMPUS, KILIMANOOR



INDEX

Sl No	Subject Code & Name	Page No.
1	ECT 402 Wireless Communication	1
2	ECT 462 Real Time Operating System	5
3	ECT 414 Biomedical Engineering	10
4	ECT 458 Internet of Things	13

ECT 402 WIRELESS COMMUNICATION

QUESTION BANK

Qn. No	MODULE – 1	Marks	Year
1	Give important features of 5G system.	3	
2	Discuss different handoff strategies.	3	
3	(a) How are co-channel signal-to-interference ratio, cluster size and system capacity are related to one another in a cellular system? Explain with necessary equations	7	
	(b) Explain the architecture of wireless LAN (WLAN).	7	
4	(a) List three differences between 2G and 3G systems.	3	
	(b) A total of 33MHz of bandwidth is allocated to an FDD cellular system which uses two 25kHz simplex channels to provide full-duplex voice & control channels. Compute the number of channels available per cell if the system uses 7- cell reuse.	3	
5	(c) What is cell splitting? How does it improve system performance?	8	
5	Describe WIMAX architecture.	8	KTU SEP 2020
6	Mention the features of Bluetooth.	5	KTU MAY 2019
7	Compare 1G, 2G, 3G & 4G systems.	5	KTU MAY 2019, JULY 2021
8	Compare the wireless networks PAN and WLAN.	5	KTU OCT 2019
9	Compare the important characteristics of second-generation cellular networks, third generation wireless networks and fourth generation wireless technologies.	7	KTU SEP 2020
10	Explain how the frequency reuse concept is significant in cellular system.	5	KTU JULY2021 KTU OCT 2019
11	With necessary diagrams explain the technique 'Hand off '. Describe the different Hand off strategies.	10	KTU MAY 2019
12	Explain channel assignments and handoff strategies in detail	8	KTU OCT 2019
13	Explain cell splitting and cell sectoring	10	
14	Describe methods to improve coverage and capacity of a cellular system.	9	

Qn.	MODULE – 2	Mark	Year
No		S	
1	Explain the notion of delay spread and coherence bandwidth.	3	
2	Give the expression for capacity of flat fading AWGN channel with CSIR. Describe how it is obtained assuming AWGN capacity.	3	
3	.(a) Explain the effect of multipath propagation using 2-ray model.	7 7	
	(b) Assuming narrow band fading model, derive statistical characterization of in-phase and quadrature components of a received signal when an unmodulated carrier is transmitted.		
4	(a) Derive time-varying impulse response of multipath wireless channel.	7	
	(b) Consider a flat-fading channel with iid channel gains $g[1]$ which can	_	MODEL
	take on values $g_1=0.05$ with probability $p_1=0.1$, $g_2=0.5$ with probability $p_2=0.5$, and $g_3=1$ with probability $p_3=0.4$. The transmit power is 10mW, noise spectral density N0 = 10-9 W/Hz, and channel bandwidth is 30kHz. Assume instantaneous CSI-R, but transmitter does not have CSI. Compute the capacity of the channel.	7	
5	Discuss ground reflection two ray model. Derive expression for received power and total electric field at a distance d and path loss for ground reflection model.	10	KTU SEP2020
6	Explain Free-Space Path Loss and derive the expression. Determine the path loss for a3.4-GHz signal propagating 20,000 m.	7	KTU SEP 2020
7	Define Coherence bandwidth	3	
8	Examine the difference between Flat fading and frequency selective fading		
9	Generalize the effect of fading in wireless channel due to Doppler spread.		
10	Explain Ergodic capacity in detail.		

	MODULE 3		
Sl.No.	Questions	Marks	KTU, Year
1	What is the purpose of using a cyclic prefix in an OFDM system?	3	MODEL
2	Define outage probability.	3	MODEL
3	(a) Derive expression for average probability of error in BPSK under Rayleigh flat fading when symbol duration is roughly equal to channel coherence time.	7	MODEL
	(b) What is Peak-to-Average Power-Ratio (PAPR) in an OFDM system? How can it be reduced	7	
4	(a) Determine the average SNR per bit of BPSK modulation in Rayleigh slow-fading channel such that 95% of the times, average probability of bit	5	MODEL
	error is less than 10-4 . (b) Explain multi-carrier modulation in OFDM.	9	
5	Under Rayleigh flat-fading, derive an expression for the required average SNR to ensure that outage probability does not below Pout .	7	
6	How can subcarrier fading be mitigated?	3	
7	Why is cyclic prefix required in OFDM?	3	
8	Explain the multicarrier modulation with necessary diagrams.	6	KTU MAY 2019
9	Define PAPR	3	
10	Explain BPSK in flat fading channels	7	
	MODULE IV		
1	Why do we say that maximal ratio combining achieves full diversity?	3	MODEL
2	(a) Explain Least-Mean-Square algorithm for equalization. (b) Compute the average probability of bit error of BPSK under maximal-ratio	9	MODEL
	combining two-branch diversity with iid Rayleigh fading. Average SNR on each branch is 10dB.	5	
3	(a) Describe Alamouti scheme for 2x2 MIMO.(b) Describe how multiple-access works on uplink and downlink in	7	MODEL
	CDMA	7	

4	Explain receiver diversity technique of maximal ratio combining technique.	7	
5	Describe Almouti scheme for 2x2 MIMO.	3	
6	Find the outage probability of BPSK modulation at $Pb = 10-3$ for a Rayleigh fading channel with SC diversity for $M = 1$ (no diversity) $M = 2$. Assume equal branch SNRs of 15 dB.	3	
7	Describe the steps for LMS algorithm.	7	
8	Compare multiple-access schemes TDMA, FDMA and CDMA	7	
9	Consider a channel with impulse response $h(t) = exp(-t/T) u(t)$. Find two- tap Zero-forcing equalizer for this channel	6	
	MODULE V		
1	Distinguish between critical frequency and maximum usable frequency.	3	MODEL
2	Define virtual height in antennas.	3	MODEL
3	(a) Derive an expression for the LOS distance in km when the antenna heights above ground are ht and hr respectively for the transmitter and receiver antennas	7	MODEL
		7	
	(b) A receiving antenna is located at 80km from the transmitting antenna. The height of the transmitting antenna is 100m. What is the required height of the receiving antenna?		
4	(a) An HF radio communication is to be established between two points on the earth's surface. The points are at a distance of 2600km. The height of the ionosphere layer is 200km and critical frequency is 4MHz. Find maximum usable frequency.	7	MODEL
	(b) Derive expression for critical frequency, maximum usable frequency and skip distance (assuming flat earth's surface) for sky wave propagation.	7	
5	Derive expression for critical frequency, maximum usable frequency and skip distance (assuming flat earth's surface) for sky wave propagation.	3	
6	Describe Ground wave propagation.		

ECT 426 REAL TIME OPERATING SYSTEMS

	Module 1						
Sl No	Questions	Mar ks	KTU,Year				
1	List any six functions of an operating system	3	Model Question Paper				
2	Differentiate microkernel and exokernel structures of operating systems.	3	Model QuestionPaper				
3 a	Explain the functions of operating system as Resource Manager.	7	Model Question Paper				
b	Describe the structure of a Process Control Block	7	Model Question Paper				
4a	Explain the monolithic and microkernel architectures of OS kernel.	7	Model Question Paper				
b	Draw the process state diagram and explain the different states	7	Model Question Paper				
5	Describe the importance of Kernel in operating system functions.	3	Course Level Assessment Questions				
6	Explain monolithic and layered architecture of operating systems.	7	Course Level Assessment Questions				
7	Draw the process state diagram and explain.	6	Course Level Assessment Questions				

		Mo	dule 2			
Sl No		Questions			Marks	KTU,Year
1	Explain the different op	3	Model Question Paper			
2	Explain the differences scheduling policies.	between Pre-emj	ptive and Non	pre-emptive	3	Model Question Paper
3 a	Explain the Shortest Rep example.	maining Time Fi	rst algorithm w	vith a suitable	7	Model Question Paper
b	Schedule the given 5 pro	ocesses with Rou	nd Robin sche	duling.	7	Model
	ProcessID	ArrivalTime	BurstTime			Question Paper
	P1	0	5	_		1 aper
	P2	1	3			
	P3	2	1	-		
	P4	3	2	_		
	P5	4	3	_		
	Draw the Gantt chart an around time for these pr	d calculate the a ocesses if time q	verage waiting uantum is 2 ur	∫ time and turn- iits,		
4 a	Compare FCFS and Rou	and -Robin sched	uling algorith	ns	7	Model Question Paper
b	Explain thread schedulin in detail.	7	Model Question Paper			
5	Schedule the following algorithm for a time of 2 zero. Also state the perfo	processes with mS. Assuming all rmance of the system	h FCFS and Il the processe stem.	Round Robin s arrives at time	7	Course Level Assessment Questions
	Proce P1 P2 P3 P4	Burs 4 5 2 3 3	st time			

6	Compare user level threads and Kernel level threads	3	Course Level
			Assessment
			Questions
7	Discuss the different types of multiprocessor scheduling operations.	7	Course Level
			Assessment
			Questions
8	Explain the possible scheduling of user level threads with a 50mS	7	Course Level
	process quantum and threads that run 5mS per CPU time.		Assessment
			Questions

	Module 3					
Sl No	Questio	Marks	KTU,Year			
	ns					
1	Draw the state diagram of RTOS queue and explain	3	Model Question Paper			
2	What you mean by priority inversion in real time systems? How the operating system manages this issue?	3	Model Question Paper			
3 a	Draw the structure of a real time operating system and explain.	7	Model Question Paper			
b	Differentiate between exceptions and interrupts. What are the different classifications of exceptions	7	Model Question Paper			
4 a	Explain how synchronization is achieved between different tasks in a real time operating system	7	Model Question Paper			
b	Describe any two inter task communication mechanisms in a real time operating systems.	7	Model Question Paper			
5	Explain the different types of semaphores used for process synchronization.	6	Course Level Assessment Questions			
6	Explain how the priority inversion problem in RTOS is solved.	3	Course Level Assessment Questions			
7	Draw the structure and explain the working of a message queue.	3	Course Level Assessment Questions			

8	Differentiate between exceptions and interrupts.	3	Course Level
			Assessment
			Questions
9	What are the different classifications of exceptions?	3	Course Level
			Assessment
			Questions

	Module 4						
Sl No	Questions	Marks	KTU,Year				
1	Explain EDD algorithm with an example	3	Model Question Paper				
2	Explain the task control block of a real time kernel.	3	Model Question Paper				
3 a	Illustrate Horn's algorithm with an example.	7	Model Question Paper				
b	Explain EDF algorithm with precedence constraints.	7	Model Question Paper				
4 a	Explain the precedence constraints of a real time task.	7	Model Question Paper				
b	Verify the schedulability and construct the scheduling according to the rate monotonic algorithm for the following set of periodic tasks r_1, r_2 and r_3 $\begin{array}{c c c c c c c c c c c c c c c c c c c $	7	Model Question Paper				
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $						
5	Explain the different timing constraints of a real time task.	3	Course Level Assessment Questions				
6	Illustrate Jackson's algorithm with an example.	7	Course Level Assessment Questions				

7	Explain EDF algorithm with precedence constraints.							Course Level
								Assessment
								Questions
8	Verify the schedulabilit	y unde	r EDF	and co	onstruc	t the schedule of the	7	Course Level
	following task set							Assessment
			Ci	Di	T1			Questions
		r_1	2	5	6			
		r_2	2	4	8			
		r_3	4	8	12			

		Module 5				
Questions	Marks	KTU,Year				
List the features of FreeRTOS.	3	Model Question Paper				
Illustrate the threads in MicroC/OS-II operating system.	3	Model Question Paper				
Illustrate the implementation of a real time system with an example,	7	Model Question Paper				
Explain the inter-process communication techniques used in Micro C/OS-II	7	Model Question Paper				
Compare the features of PSOS, VRTX and RT Linux 7	7	Model Question Paper				
Prepare suitable requirements table for an RTOS control system used in adaptive cruise control.	7	Model Question Paper				
Illustrate the implementation of a real time system with an example	7	Course Level Assessment Questions				
With a block schematic explain the real time control system used in an adaptive cruise control.	7	Course Level Assessment Questions				
	Questions List the features of FreeRTOS. Illustrate the threads in MicroC/OS-II operating system. Illustrate the implementation of a real time system with an example, Explain the inter-process communication techniques used in Micro C/OS-II Compare the features of PSOS, VRTX and RT Linux 7 Prepare suitable requirements table for an RTOS control system used in adaptive cruise control. Illustrate the implementation of a real time system with an example With a block schematic explain the real time control system used in an adaptive cruise control.	QuestionsMarksList the features of FreeRTOS.3Illustrate the threads in MicroC/OS-II operating system.3Illustrate the implementation of a real time system with an example, C/OS-II7Explain the inter-process communication techniques used in Micro C/OS-II7Compare the features of PSOS, VRTX and RT Linux 77Prepare suitable requirements table for an RTOS control system used in adaptive cruise control.7Illustrate the implementation of a real time system with an example n adaptive cruise control.7				

ECT 414 BIOMEDICAL ENGINEERING

SI	Question	Marks	KTU
No	Question	101ul Kö	Year
1	What is a microelectrode? List any two	3	Model
			Que
2	List three typical features of a biopotential amplifier	3	Model
			Que
3	a) Explain about electrode-electrolyte interface and the electrical activity	8	Model
	associated with one contraction in a muscle.		Que
	b) Explain isolation amplifier with a neat diagram?		
		4	
4	a)How does depolarisation and repolarisation occur in a cell?	7	Model
	b) Explain chopper amplifier with a neat diagram? State applications		Que
		7	
5	Write short notes on a) ECG b) EMG c)EEG D) EOG signals	8	
6	Explain in detail about different types of Electrodes	7	
0	Explain in detail about different types of Electiodes	,	
7	Explain in detail about various type of Bio potential amplifiers	7	
		_	
8	Explain the different types of bio electric potential with diagram.	7	
9	How does polarization and repolarization occur in cell	7	
10	Explain action potential and Resting Potential of brain?	7	

MODULE 1

MODULE 2

Sl	Question	Marks	KTU
No			year
1	a) With necessary illustration, explain any two basic ECG lead	7	Model
	configurations.		Que
	b) Explain ultrasonic blood flow meter with neat diagram? What are the	7	
	advantages over other flow meters?	/	
2	a)Explain electro conduction system of the heart with illustration	7	Model
	b) Compare direct and indirect blood pressure measurement. What is		Que
	Korotkoff sound in blood pressure measurement?	7	
3	Explain ECG machine with a block diagram	7	
4	A patient was subjected to non-invasive method of blood pressure	7	
	measurement. Which is the method used? What is the principle behind the		
	method and how is it done?		
5	Draw and explain the Einthoven triangle	8	Model
			Que
6	List the various blood pressure measurement techniques	6	Model
			Que
7	Explain ECG recording system.	3	

	Module 3			
Sl	Question	Marks	KTU	
No			year	
1	Explain instrumentation system for acquiring EMG?	3		
2	Explain how functional activity can be elicited from the paralyzed limb of	3		
	a spinal cord injured patient using electrical stimulation			
3	a) With necessary block schematic explain the principle of operation of a	7	Model	
	myoelectric controlled prosthetic device.		question	
	b) With necessary illustration, explain the placement of electrodes for	7		
	recording EEG signal.	/		
4	a) Explain different respiratory parameters. Explain the working of a	7	Model	
	spirometer.		question	
	b) List six applications of Functional electrical stimulation and explain	_		
	one application in detail.	7		
5	Explain action potential and Resting Potential of brain?	3	Model	
			question	
6	What is meant by nerve conduction velocity. What is its significance?	3	Model	
			question	
7	Explain EMG signal Acquisition	5		
8	Explain applications of EMG	3		

Module 4

Sl	Question	Marks	KTU
No			year
1	List three ventilator parameters and explain any one	3	Model
			question
2	What is ventricular defibrillation	3	Model
			question
3	a) What is a pacemaker? What is its significance? Explain the working	7	Model
	with illustration of an atrio-synchronous pacemaker.		question
	b) What is diathermy? With a neat block schematic diagram, explain the	-	
	working and applications of surgical diathermy equipments.	/	
4	a) What is dialysis? Explain any one type of dialyzer with necessary	7	Model
	illustration		question
	b) With the help of neat block diagram, explain the components of	-	
	biotelemetry system		
5	Explain ventilator parameters?	5	
6	What is a cardiac defibrillator? With a neat diagram explain DC	7	
	defibrillator.		
7	With a neat block diagram explain single channel ECG telemetry	7	
	transmitter		
8	Explain heart lung machine	7	

Sl	Question	Marks	KTU	
No			year	
1	Explain the principle of basic pulse echo system with necessary diagrams.	7		
2	Compare NMR imaging and CT imaging.	5		
3	a) With a neat block diagram, explain the technique of producing CT	7	Model	
	images.		question	
	b) Explain the principle and any one application of M-mode display in ultrasound systems	7		
4		8	Model	
•	a)Explain the components of an NMR imaging system with neat block	0	question	
	diagram		1	
	b) Explain how electric shock is hazardous to human body. What changes			
	it will bring in the body, when the current increases.	6		
5	What are the electric shock hazards?	3	Model	
			question	
6	Compare NMR imaging and CT imaging	3	Model	
			question	
7	Explain X Ray imaging and its properties	7		
8	Explain the working principle of CT	7		

Module	5
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ECT 458 INTERNET OF THINGS

MODULE I

SL.N o	Questions	Marks	KTU,YEAR
1	Define Internet of Things	3	Model Question
2	Discuss the benefits of IoT in health care	3	Model Question
3	Discuss the logical design of IoT	3	Model Question
4	Describe various applications of IoT	6	Model Question
5	What are the IoT enabling technologies?	7	Model Question
6	Discuss the physical and logical design of IoT	7	Model Question
7	Describe the various applications of IoT in Home Automation	7	Model Question
8	Discuss the smart home components	7	Model Question
9	Write a note on physical design of IoT.	7	Model Question
10	Explain the characteristics of IoT	7	Model Question
11	Give a detailed description of the link layer, network layer, transport layer and application layer protocols.	8	Model Question
12	What are the functional blocks of IoT? Explain?	8	Model Question
13	Discuss different communication models used in IoT.	8	Model Question
14	Explain the architecture of IoT	8	Model Question
	MODULE II		
1	What is a wireless sensor network?	3	Model Question
2	What are the limitations of smart objects in WSNs??	3	Model Question
3	State differences between M2M and IoT technology	3	Model Question
4	Explain the need for IP optimization in IoTs?	3	Model Question
5	State differences between Ipv4 and IPv6	7	Model Question

6	What are the various components involved in implementation of IoT	7	Model Question
7	What are the differences between IoT and M2M?	7	Model Question
8	What are the issues of conventional networking architectures? How is it solved inSDN?	7	Model Question
9	What are smart objects? What are their characteristics and the trends in smart objects?	7	Model Question
10	What are the characteristics and attributes to be considered for connecting smartobjects	7	Model Question
	MODULE III		
1	What are the transmission modes used in modbus?	3	Model Question
2	What are the 4 different cloud deployment models? Explain	3	Model Question
3	Explain IEEE 802.15.4 physical layer, MAC layer and security implementation with the help of frame formats.	9	Model Question
4	What are the modifications included in IEEE 802.15.4 e and g versions as compared to IEEE 802.15.4?	5	Model Question
5	With the help of a diagram explain the Zigbee protocol architecture.	7	Model Question
6	Explain LoraWAN architecture. Give a detailed description of the physical layer andMAC layer of LoraWAN	7	Model Question
7	Explain 6LoWPAN and overview of 6LoWPAN adaptation layer	7	Model Question
	MODULE IV		
1	What is cloud computing? Explain.	3	Model Question
2	What are cloud service models	3	Model Question
3	Write a note on different cloud service models	6	Model Question
4	What is virtualization in cloud computing? Explain the features, advantages and concerns of cloud computing.	8	Model Question
5	With the help of a diagram explain the basic building blocks of an IoT device	7	Model Question
6	Explain cloud based data collection, storage and computing services provided byXIVELY cloud platform.	7	Model Question

	MODULE V		
1	List the five functional units of security	3	Model Question
2	What is message integrity? How it is checked?	3	Model Question
3	What is security and Privacy? List the 10 vulnerabilities of IoT.	7	Model Question
4	Explain the layered attacker model.	7	Model Question
5	With the help of a diagram explain the 4 layer smart city architecture	7	Model Question
6	Write a note on street lighting architecture with the help of a diagram	7	Model Question