

UNIVERSITY OF PUNE

[4364]-581

B. E. (E & TC)

Mobile Communication

(2008 Pattern) (Elective - II)

Total No. of Questions : 12

[Total No. of Printed Pages :3]

[Time : 3 Hours]

[Max. Marks : 100]

Instructions :

(1) Answer 3 question from section-I and 3 question from section-II

*(2) Answers to the **two sections** should be written in **separate answer-books**.*

(3) Neat diagram must be drawn wherever necessary.

(4) Use of electronic pocket calculator is allowed.

(5) Assume suitable data, if necessary.

Q1.

a) Explain frequency reuse concept with suitable diagram [8]

b) What is hand off mechanism? Explain practical handoff considerations [8]

OR

Q2.

a) Define Co-channel interference and Adjacent channel interference and

Which are techniques for its reduction? [8]

b) Discuss evolution of modern wireless communication system from 2G to 3G networks [8]

Q3.

a) Consider that a geographical service area of a cellular system is 4200 km^2 . A total of 1001 radio channels are available for handling traffic suppose the area of a cell is 12 km^2 . [9]

- 1) Calculate the no. of channels per cell and the system capacity if cluster size is 7.
 - 2) Repeat the same if cluster size is 4. Comment on the result.
- b) Discuss three basic propagation mechanisms in wireless communication. [8]

OR

Q4.

- a) If $P_t=10W$, $G_t=0dB$, $G_r=0dB$ and carrier frequency is 900MHz, find received power in Watts at a free space distance of 1 km. also calculate EIRP for the same [8]
- b) Explain types of small scale fading. [9]

Q5.

- a) Explain Minimum shift keying (MSK) with transmitter and receiver block diagram. [9]
- b) Explain BPSK and DPSK and compare performance of both. [8]

OR

Q6.

- a) Explain the schemes FDMA and TDMA with examples. [9]
- b) Explain with block diagram of adaptive equalizers and performance of algorithm for adaptive equalizers. [8]

SECTION-II

Q7.

- a) What are criteria for selection of codec for mobile communication. [8]
- b) Example GSM codec with block diagram. [8]

OR

Q8

- a) Write a short note- SDMA. [8]
- b)What is spread spectrum Multiple Access? Explain FHMA in details. [8]

Q9.

- a) Explain GSM Services in detail. [8]
- b)Describe GSM architecture with block diagram [9]

OR

Q10.

- a)If a normal GSM time slot consists of 6 trailing bits, 8.25 guard bits, 26 training bits and two traffic burst of 58 bits of data, find the frame efficiency. [8]
- b)Explain steps involved in call setup in intra-MSC handover in GSM. [9]

Q11.

- a)Describe different types of Handoffs in CDMA. [8]
- b)Explain different logical channels for CDMA. [9]

OR

Q12.

- a)Explain need of power control and how power is controlled in CDMA? [9]
- b)Tabulate following parameters to compare IS-95 CDMA and CDMA 2000 standards. [8]

- 1.Carrier spacing 2. Chip rate 3. Modulation type 4.Frame duration
- 5. Generations.

[Total No. of Questions: 12]

[Total No. of Printed Pages: 4]

UNIVERSITY OF PUNE

[4364]-584

B. E. (E & TC) Examination - 2013

Soft Computing (2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 Answer 3 questions from Section I and 3 questions from Section II
- 2 Answers to the **two sections** should be written in **separate answer-books**.
- 3 Neat diagrams must be drawn wherever necessary.
- 4 Black figures to the right indicate full marks.
- 5 Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6 Assume suitable data, if necessary.

SECTION -I

- Q.1 A Write note on (any three) 18
- i) Applications of soft computing
 - ii) Artificial neural network for linear regression
 - iii) Hybrid learning in ANFIS
 - iv) Compare and contrast Hard and soft computing

OR

- Q.2 A State the operations on Fuzzy sets and the 8
Commutativity, Associativity and Distributivity
Properties of Fuzzy sets
- B We want to compare two sensors based upon their 10
detection levels and gain settings. The following table
of gain setting and sensor detection levels with a
standard item being monitored provides typical
membership values to represents to detection levels for
each of the sensors:

Gain setting	Sensor 1 detection levels	Sensor 2 detection levels
0	0	0
20	0.5	0.35
40	0.65	0.5
60	0.85	0.75
80	1	0.90
100	1	1

The universe of discourse is $X = \{0, 20, 40, 60, 80, 100\}$. Compute the membership function for two sensors and the following membership functions using standard set operations:

- a) $\mu_{S_1 \cup S_2}(x)$
- b) $\mu_{S_1 \cap S_2}(x)$
- c) $\mu_{\overline{S_1}}(x)$
- d) $\mu_{\overline{S_2}}(x)$
- e) $\mu_{\overline{S_1 \cup S_2}}(x)$

Q. 3 A Explain any Centroid method and Max- membership- principle method for de-fuzzification in details 8

B Consider fuzzy relations: 8

$$R = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \begin{bmatrix} 0.7 & 0.6 \\ 0.8 & 0.3 \end{bmatrix} \end{matrix}, \quad S = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \begin{bmatrix} 0.8 & 0.5 & 0.4 \\ 0.1 & 0.6 & 0.7 \end{bmatrix} \end{matrix}$$

Find the relation $T = R \circ S$ using max-min and max-product composition

OR

Q. 4 A Explain the fuzzy logic controller Design with a suitable example. 8

B Explain the situations where fuzzy Logic Controllers are more appropriate than conventional PID controllers. 8

Q. 5 A Describe the design process for a single input-single output Mamdani FIS. Assume that the input variable is TEMPERATURE with range 0°C to 60°C and the output is FANSPEED with range 0 to 1000 RPM. Also assume three membership functions for input as well as output variables. The rules for the system are:
Rule 1: IF “TEMPERATURE” IS “COLD” THEN “FANSPEED” IS “SLOW”
Rule 2: IF “TEMPERATURE” IS “NORMAL” THEN “FANSPEED” IS “MEDIUM” 16

Rule 3: IF “TEMPERATURE” IS “HOT” THEN “FANSPEED” IS “FAST”

Partition the input variables as “COLD”, “NORMAL” and “HOT”, output variable as “SLOW”, “MEDIUM” and “FAST”, respectively.

Show graphically the interface for FANSPEED value

OR

- Q. 6 A Explain the following terms with reference to fuzzy inference systems: 6
- i) Premise (Antecedent)
- ii) Conclusion (Consequent)
- ii) FAM
- B Given a rule: If x is A , THEN y is B , where 10
- $A = \left\{ \frac{0.2}{1}, \frac{0.5}{2}, \frac{0.7}{3} \right\}$ and $B = \left\{ \frac{0.6}{5}, \frac{0.8}{7}, \frac{0.4}{9} \right\}$
- Infer B' for another rule:
- IF x is A' , THEN y is B' , where $A' = \left\{ \frac{0.5}{1}, \frac{0.9}{2}, \frac{0.3}{3} \right\}$,*
- using Mamdani implication rule.

SECTION II

- Q. 7 A Explain the structure of biological neuron and its electrical model with neat figures. 8
- B Using Mc-Culloch Pitts neurons, implement a unipolar XOR function. 8
- OR**
- Q. 8 A What is Hebb network? Explain the learning mechanism of Hebb network and the modification to the same to avoid saturation of weights. 8
- B State the perceptron learning algorithm. What is the basic limitation of the perception? 8
- Q. 9 Train a Radial Basis Function Network to solve the XOR problem shown below. 16

Input-Output table	Network parameters															
X1,x2 are inputs and y is output <table><tr><td>x1</td><td>x2</td><td>Y</td></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>	x1	x2	Y	0	0	0	0	1	1	1	0	1	1	1	0	Assume two cluster with centers as C1=[0,0] and C2=[1,1] Select the two ϕ -functions as Gaussian with $\mu=0$ and $\sigma = \sqrt{1/2}$ Use direct solution approach instead of gradient descent for the supervised training
x1	x2	Y														
0	0	0														
0	1	1														
1	0	1														
1	1	0														

OR

Q. 10 A Explain the architecture of Radial Basis Function Network and explain the learning mechanism. How are the clusters determined? 16

Q. 11 A State the learning algorithm for self Organized feature map network. 10

B State the essential processes in Self Organized Feature Map Network. 8

OR

Q. 12 A Draw and explain the architecture of ANFIS. 9

B What are the pros and cons of an ANFIS network? 9

[Total No. of Questions: 12]

[Total No. of Printed Pages: 2]

UNIVERSITY OF PUNE

[4364]-587

B. E. (Electronics & Telecommunication) Examination - 2013

TEST AND MEASUREMENT SYSTEMS (2008 Course)

(ELECTIVE-III) (SEM.-II)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions: Answer any three questions from each section.

- 1 Answer 3 questions from Section I and 3 questions 2 from Section II
- 2 Answers to the **two sections** should be written in **separate answer-books**.
- 3 Black figures to the right indicate full marks.
- 4 Use of electronic pocket calculator is allowed.
- 5 Assume suitable data, if necessary.

SECTION -I

- | | | | |
|-----|---|--|---|
| Q.1 | A | What are standards of the measurement, also explain the IEEE standards. | 8 |
| | B | Ten repeated measurements of a light intensity are: 10.3, 12.6, 11.5, 14.3, 15.2, 13.6, 12.3, 14.5, 12.9, 10.8 W/m ² . Calculate the arithmetic mean, average deviation, standard deviation and Probable error of the average above ten readings. | 8 |

OR

- | | | | |
|------|---|--|----|
| Q.2 | A | Draw block diagram of digital data acquisition system and explain the blocks. | 8 |
| | B | Explain the need of calibration. Also explain the calibration standards and traceability | 8 |
| Q. 3 | A | What is need of RF Vector Voltmeter? Explain the working with its block diagram. | 10 |
| | B | List the specifications of Digital Voltmeter (DVM) to be considered while its selection. | 6 |

OR

- | | | | |
|------|---|---|----|
| Q. 4 | A | Draw block diagram of Successive Approximation Digital Voltmeter and explain its working. Also explain the effect of quantizing error on measurement. | 10 |
| | B | What would a true-rms reading meter indicate if a pulse waveform of 5V peak and 25 percent duty cycle were applied? What would the meter indicate if a 5V dc input were applied (assume the meter is directly coupled)? | 6 |

- Q. 5 A List and explain different types of CRO probes. What are advantages of active probe? 10
- B What are architectural differences between Digital Storage Oscilloscope (DSO) and Digital Phosphor Oscilloscope (DPO)? Give typical applications of DPO. 8

OR

- Q. 6 A List and elaborate atleast top eight things to consider while selecting DSO. 8
- B What is need of delay line in High Frequency Oscilloscope? Also explain one from delay line. 6
- C The rise time measure on 100 MHz DSO is 19 nano seconds, find actual rise time of the signal. 4

SECTION II

- Q. 7 A Draw a detail block diagram of Swept Super heterodyne Spectrum analyzer and explain its working. Also discuss in detail the block deciding frequency resolution and bandwidth. 10
- B Explain FFT Analyzer with neat block diagram and list its advantages and limitations. 8

OR

- Q. 8 A Elaborate the different trigger capabilities of logic analyzer that differentiate it from other equipments. 6
- B What is the primary difference between harmonic distortion analyzer? A complex wave from have got first 3 harmonics with amplitude 1v, 0.2V, and 0.1v. What will be reading of % harmonics distortion on harmonic Distortion Analyzer? 8
- C State the different capabilities of MSO. 4
- Q. 9 A What are different approaches of frequency synthesis? Give typical specifications of synthesizer an elaborate atleast two applications. 8
- B Draw and explain the block diagram of an Arbitrary Waveform Generator (AWG). What is meant by vertical resolution? 8

OR

- Q. 10 A Define s parameters for microwave network. Give setup for measurement of S parameters for one port microwave network. 8
- B List and compare different solid state microwave signal sources. 8
- Q. 11 A Explain the detail structure of IEEE 488 instrumentation bus used to interface spectrum analyzer with computer. 8
- B Draw a block diagram of virtual instrument with its components and explain. 8

OR

- Q. 12 A What are the requirements of the Automatic Test System. 8
- B List and explain the features of LABVIEW. 8

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

UNIVERSITY OF PUNE

[4364]-590

B. E. (E & TC) (SEM-II) Examination - 2013

NANOTECHNOLOGY(404190)

ELECTIV-IV (2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 *Answer any three questions from each section.*
- 2 *Answers to the two sections should be written in separate answer-books.*
- 3 *Neat diagrams must be drawn wherever necessary.*
- 4 *Figures to the right indicate full marks.*

SECTION -I

- | | | | |
|-----|---|---|---|
| Q.1 | A | Explain “Fundamental Science behind Nanotechnology” | 8 |
| | B | Explain optical properties at Nanoscale. | 8 |

OR

- | | | | |
|------|---|--|---|
| Q.2 | A | What are the tools used for making Nanostructures.
Explain (any Four) | 8 |
| | B | Explain molecular recognition with respect to
Nanoscience. | 8 |
| Q. 3 | A | Compare Floating Gate NVM and Nanocrystal based | 8 |

NVM.

B Write challenges of Nano CMOS implementation 8

OR

Q. 4 A At Nano-scale what are the problems associated with dielectric material? How Novel dielectric materials can help to overcome these problems. 8

B Draw and explain process flow for integrating nanocrystal memory with standard CMOS technology. 8

Q. 5 A Explain the different structures of carbon Nanotubes. 9

B Discuss electric and mechanical properties of CNT. 9

OR

Q. 6 A Write short notes on (Any Three) 18

- a) Application of Carbon Nanotube
- b) Fabrication of Carbon Nanotube
- c) Magic Numbers and optical properties of Nanoparticles
- d) Single walled and Multi walled carbon Nanotube.

SECTION II

Q. 7 A Write differences between NEMS and MEMS. 8

B Explain switching process of azobenzene molecule with schematic representation. 8

OR

Q. 8 A Explain working and fabrication of Roxatane molecular switch. 8

B Write short note on “Nanomachines”. 8

Q. 9	A	Explain e-beam lithography.	8
	B	Explain atomic lithography.	8

OR

Q. 10		Write short notes on (Any three)	16
		a) Nano-Electronics for Advanced Computation	
		b) Nano-Electronics for Advanced Communication	
		c) Single electron Transistor	
		d) Optical Lithography.	

Q. 11	A	Explain applications of Nanotechnology in Optics.	9
	B	Explain Bio-medical applications of Nano-Electronics (Any Three).	9

OR

Q. 12	A	Write short notes on	18
		a) Nanosensors	
		b) Gates and switches	
		c) Soft molecule electronics	
		d) Light Production and Light Transmission.	

UNIVERSITY OF PUNE
[4364]-573
B. E. E & TC Examination - 2013
Computer Networking
(2008 Pattern)

Total No. of Questions : 12

[Total No. of Printed Pages :2]

[Time : 3 Hours]

[Max. Marks : 100]

Instructions :

- (1) Answer **any 3** questions from each section.
 - (2) Answer 3 question from Section I and 3 question from section II
 - (3) Answers to the **two sections** should be written in **separate answer-books**.
 - (4) Neat diagrams must be drawn wherever necessary.
 - (5) Black figures to the right indicate full marks.
 - (6) All questions carry equal marks.
 - (7) Your answer will be valued as a whole.
 - (8) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
 - (9) Assume suitable data, if necessary.
-
-

SECTION-I

- Q.1 a) Draw OSI-reference model and explain any three layers [9]
b) Differentiate OSI reference model and TCP/IP [9]

OR

- Q.2 a) Explain various classes of IP-addressing [9]
b) Compare circuit switching and packet switching [9]

- Q.3 a) What are channel allocation issues? [6]
b) Analyze the channel allocation for deciding the effect of increasing number of stations. [10]

OR

- Q.4 a) How the problem of contention is avoided for the channel. Explain giving suitable example. [8]

b) What is the peak through put achievable by a source employing stop-and-wait flow control, when maximum packet size is 1000kbytes and network span of 10km. [8]

Q.5 a) State and explain features of IEEE 802.11 [8]

b) Draw suitable diagram and explain virtual LAN [8]

OR

Q.6 a) Define and explain a) Basic Service Set (BSS)

b) Extended Service Set (ESS) [8]

Can these be use to form internet? Justify

b) Draw Bluetooth layers and explain. [8]

SECTION-II

Q.7 a) List out various parameters taken into account for IGMP [6]

b) List various protocols giving their significance in network layer. [10]

OR

Q.8 a) Compare IPV4 and IPV6 [10]

b) Explain unicast, multicast routing [6]

Q.9 a) Explain the functions of Transport layer [8]

b) Compare TCP and UDP services for transport layer. [8]

OR

Q.10 a) What are the parameters for Quality of service (QOS) How to congestion problem is resolved? [8]

b) Explain the count-to-infinity entry in routing table [8]

Q.11 a) what do you mean by DNS? Explain [8]

b) Explain Email services in brief. [8]

OR

Q.12 a) How symmetric key and public key is used in cryptography [10]

b) Explain the utility and security aspects in digital signature. [8]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

UNIVERSITY OF PUNE

[4364]-582

B. E. (Electronics & Telecommunications) Examination - 2013

Telecommunications & Switching Systems (2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 *Answer three questions from each section.*
- 2 *Answers to the **two sections** should be written in **separate answer-books**.*
- 3 *Neat diagrams must be drawn wherever necessary.*
- 4 *Black figures to the right indicate full marks.*
- 5 *Use electronic pocket calculator is allowed.*
- 6 *Assume suitable data, if necessary.*

SECTION -I

- Q.1 A Explain Memory controlled time division switching with a neat diagram. 8
- B Draw the block diagram for a three stage Switching matrix with 'N' inlets and 'N' outlets with 'k' number of switches in the second stage and each inlet-outlet group of size 'n'. calculate total number of cross-points in terms of N, n and k. 8

OR

- Q.2 A Derive and calculate the availability for dual processor systems with MTBF =2000 Hrs and MTTR=4Hrs in 15 year. 8
- B Compare Message switching, Packet switching and Circuit switching. 8

- Q. 3 A Define and explain following terms 8
- i. BHCA
 - ii. CCR
 - iii. 1 Erlang
 - iv. Grade of Service
- B On average one call arrives every 5 seconds. During a period of 10 seconds, what is the probability that 8
- i. No call arrives
 - ii. One call arrives
 - iii. Two call arrives
 - iv. More than two call arrive

OR

- Q. 4 A State and explain Erlang's delay formula. 6
- B The traffic statistics of a company using EPABX indicates that 200 outgoing calls are initiated every hour during work hours. Equal number of calls comes in. On averages each call lasts for 180 seconds. If GOS required is 0.07 determine number of lines required between EPABX and main exchange. 10
- Q. 5 A Explain the Progressive Grading, Skipped Grading and Homogeneous Grading. Draw neat diagrams. 10
- B Explain the concept of call packing and rearrangeable networks. 8

OR

- Q. 6 A Explain the terms with the help of neat diagrams. 10
- i. Associated signaling
 - ii. Quasi-associated signaling
 - iii. Non-associated signaling
 - iv. Signal Transfer point
- B State and explain call processing functions for a telephone call. 8

SECTION II

- Q. 7 A Draw phase locked loop clock recovery circuit and explain its operation with waveforms. 8
- B List approaches used in synchronizing a digital network. Explain any two. 8

OR

- Q. 8 A Explain the Routing control in Network management. 8
- B Draw and explain block schematic diagram for connections between two autonomously timed digital switches. What are slips? How are they controlled? 8

- Q. 9 A Write a brief note on ISDN Transmission Channel. 8
- B Explain the link to link layers in an ISO-OSI Reference Model for Communications architecture. 8

OR

- Q. 10 A Write a short note on ISDN services. 8
- B State advantages and disadvantages of LANs. 8

- Q. 11 A Explain in detail Cellular Telephone to Cellular Telephone call procedure 10
- B Explain the following terms with reference to cellular telephone network 8
- i. Co-channel interference
 - ii. Adjacent channel interference

OR

- Q. 12 A Explain radio link features in a GSM system 10
- B Explain the terms 8
- i. FHSS
 - ii. DSSS

University Of Pune

[4364]-575

B.E (E &TC)

EMBEDDED SYSTEMS AND RTOS

(2008 Patten) (Elective -I)(Semester -I) (Theory)

Time : 3 Hours

[Max Marks : 100]

Instructions to candidates:

- 1) Answer any 3 questions from each section.
- 2) Answers to the two sections should be written in separate books.
- 3) Assume suitable data, if necessary.
- 4) Figures to the right indicate full marks.
- 5) Neat diagrams must be drawn wherever necessary.
- 6) Use of non programmable electronic pocket calculator is allowed.

SECTION- I

Q1) a) what is NRE cost, unit cost and market window why it is so important for product to reach early in market window? [10 marks]

b) List the different processors available for embedded system applications. [8 Marks]

OR

Q2) a) what are recent trends in embedded system also explain different categories of Embedded systems. [10 marks]

b) Explain the following terms

i) Win CE operating system

ii) Wireless communication protocol: Bluetooth

Q3) a) Compare ARM7, ARM9 and ARM11. List the applications of these processors. [8 marks]

b) Draw the interfacing diagram between LPC 2148 and LCD display. Write down the code to display "PUNE" on LCD. [8 Marks]

OR

Q4) a) what are the limitation of 8 bit processor and how it is overcome in 32 bit processor. [8 marks]

b) Explain the steps involved in designing embedded system from memory selection point of view. [8 marks]

Q5) a) Compare multiprocessing and multitasking and explain various techniques of multitasking. [8 Marks]

b) What are the selection criteria of task scheduling techniques?

[8 Marks]

OR

Q6) a) Explain the concept of context switching. List and explain the different states of a task. [8 Marks]

b) Explain mailbox technique of Inter Process/Task communication

[8 Marks]

SECTION - II

Q7) a) what is Linux kernel configuration. Explain the steps in Linux kernel configuration. [8 Marks]

b) Explain the following tool utilities in Embedded Linux system.

i) Bin utility

ii) Boot Loader

iii) Busy Box.

[10 Marks]

OR

Q8) a) Explain the device driver with a suitable application. [8 Marks]

b) List and explain various file systems used in Embedded Linux. [10 Marks]

Q9) a) what are different features of SYMBIAN Operating System that makes it more suitable to use in mobile operating system? [8 Marks]

b) List features of VxWorks real time operating system. [8 Marks]

OR

Q10) a) Explain different stages of the embedded development process in waterfall model. [10 marks]

b) Explain the features of Android OS used in smart mobile phones.

[6 Marks]

Q11) a) Explain the different software requirement for the ATM. [8 Marks]

b) Explain the features of processor, memory and I/O device required for implementation of mobile phone. [8 marks]

OR

Q12) a) State hardware requirement of digital camera. Suggest suitable processor, memories and I/O's for it. [8 marks]

b) Explain tasks, its priorities and IPC use in smart energy meter.

[8 Marks]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

UNIVERSITY OF PUNE

[4364]- 589

B. E. (E&TC) Examination - 2013

Automotive Electronics(Elective-IV)(2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and*
- 2 *Answers Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II*
- 3 *Assume suitable data, if necessary.*

SECTION -I

- | | | | |
|-----|---|--|----|
| Q.1 | A | Explain with a neat diagram 4-stroke operation of SI engine? | 10 |
| | B | Explain different types of Hybrid vehicles. | 8 |

OR

- | | | | |
|-----|---|--|----|
| Q.2 | A | How is spark pulse generated? What is the method of spark timing control in ignition System? | 10 |
| | B | What are the differences in SI & Diesel engine operation? | 8 |

- | | | | |
|------|---|---|---|
| Q. 3 | A | Explain the methods with principle of sensor operations of the following: | 8 |
| | | i) MAP | |
| | | ii) Exhaust Oxygen sensing | |
| | | iii) Throttle plate sensing | |
| | | iv) Engine speed | |

B Explain significance of above sensors towards engine efficiency. 8

OR

Q. 4 A What is the requirement of Instrumentation Amplifier? How is interfacing need satisfied with it? 8

B What are the different types of actuators used in automotive electronics? Explain working Principle of Solenoid & its role in fuel injection system. 8

Q. 5 A Explain various aspects of Engine Management System. 8

B How Automotive Cruise Control (ACC) is implemented? What are practical problems in it? 8

OR

Q. 6 A What is the need of traction control? How is it implemented? 8

B Explain the importance of ABS how is it implemented? 8

SECTION II

Q. 7 A Explain how Capture/Compare/PWM feature of PIC microcontroller is used in Automotive Electronics. 10

B Write a 'C' program for PIC microcontroller to control fuel injection using PWM timer. 8

OR

Q. 8 A Explain the tool-chain for developing and Embedded 'C' program. 10

B Write a 'C' program for PIC microcontroller to indicate coolant temperature on a LCD display. 8

Q. 9 A Explain the features of CAN. How is it suitable for Data Communication in Automotive Electronics? 8

B With an example, explain utility of GPS & GPRS in automotive environment. 8

OR

Q. 10	A	Explain the features of FlexRay. How is it suitable for Data Communication in Automotive Electronics?	8
	B	How does MOST satisfy the infotainment communication requirement?	8
Q. 11	A	What is On-Board diagnostics? What are its advantages?	8
	B	Enlist the various safety features incorporated in modern Automotive systems.	8
OR			
Q. 12	A	What is Off-Board diagnostics? What are its advantages?	8
	B	What are the future trends for emission control?	8

UNIVERSITY OF PUNE
[4364-571]
B.E(Electronics and Telecomm)
(2008 pattern)

Time-Three hours

Maximum Marks-100

[Total No. of Question=12]

[Total no. of printed pages= 3]

Note:

- (1) Answer any three questions from each Section.
 - (2) Answers to the two sections should be written in separate answer books.
 - (3) Neat diagram must be drawn necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data wherever necessary.
-

SECTION-I

Q.1 (a) Explain the concept of reliability with Bath tub curve. Explain the terms MTTF and MTBF. (10)

(b) Explain different reliable soldering practices State their advantages and limitations. (8)

OR

Q.2 (a) With the help of neat block diagram explain different stages of electronic product design. (10)

(b) Explain how the environmental conditions affect the reliability of any instrument or system. (8)

Q.3(a) What are the various factors affecting choice of OP-AMP in signal conditioning applications. (8)

(b) What is the need of VREF in ADCs. Explain the factors to be considered while selecting VREF (8)

OR

Q.4 (a) Explain important specifications of ADCs and DACs from design point of view. (8)

(b) Explain the need of instrumentation amplifier in analog signal conditioning. Explain different errors occurring in Instrumentation Amplifier. (8)

Q.5 (a) With neat diagram explain how to interface keyboard with microcontroller. (8)

(b) Explain I2C and CAN protocols with application and limitations. (8)

Or

Q.6 (a) Explain the selection of microcontroller for particular application on the basis of type of architecture. (8)

(b) Explain working principle of analog resistive touch screen. Interface 4 wire resistive touch screen with microcontroller. (8)

SECTION-II

Q.7

(a) Explain in detail water flow model of software design. (9)

(b) Explain different factors affecting the choice between Assembly language and high level language. (9)

OR

Q.8 Write a short note on. (18)

- a) Modular programming
- b) In circuit Emulator
- c) Software debugging technique

Q.9

(a) Explain different design considerations in the design of PCBs for high speed digital circuits. (8)

(b) What is the need of conducting compliance test? Explain different EMI/EMC standards related to conducted and radiated emissions. (8)

OR

Q.10

(a) Estimate the parasitic values for following geometries of PCB tracks. (8)

(i) Resistance of 10cm long copper track with 0.6mm width on standard 35 micron copper clad laminate. [Resistivity of Cu $1.72 \times 10^{-6} \text{ ohm.cm}$]

(ii) Capacitance of two 1.5mm wide tracks on opposite faces of a double sided PCB each with track length of 20cm. PCB laminate thickness 1.6 mm and relative permittivity 4.5.

(b) Give reasons- (8)

- (i) Shielded room is necessary while carrying out EMI/EMC testing.
- (ii) For an embedded electronic system multilayer PCBs are preferred.

Q.11(a) With the help of block diagram explain the implementation of radio link. (8)

(b) What is spectral bandwidth? How to find the spectral bandwidth of Gaussian signal? (8)

OR

Q.12 (a) Explain with reasons the selection of particular band of frequency spectrum for various communication applications. (8)

(b) Write a short note on- (8)

(i) Signal to noise ratio and SINAD

(ii) Equalizer

UNIVERSITY OF PUNE

[4364]-572

B. E.(Electronics & Telecommunication)Examination - 2013

VLSI DESIGN & TECHNOLOGY (404182)

(2008 Pattern)

[Total No. of Questions:]
[Time : 3 Hours]

[Total No. of Printed Pages :3]
[Max. Marks : 100]

Instructions :

- (1) Answer **any three** questions from each section.
- (2) Answers to the **two sections** should be written in **separate answer-books**.
- (3) Black figures to the right indicate full marks.
- (4) Neat diagrams must be drawn wherever necessary.
- (5) Assume suitable data, if necessary.

SECTION-I

- Q1 a) What are the advantages of cascade amplifier? Draw the diagram of Cascade amplifier and explain its voltage transfer curve? [8]
- b) Explain MOS device as a Resistor and Diode, with the help of equivalent diagram. [8]

OR

- Q2 a) Draw and explain Push Pull CMOS Inverter. Also draw the small signal model of push pull CMOS Inverter. [8]
- b) Explain classical Two stage CMOS opamp with the help of diagram. [8]
- Q3 a) Explain, why the ratio of B_n/B_p should be equal to be one, for the CMOS Inverter? Also, draw the Transfer characteristic of CMOS Inverter. [8]
- b) What is DRC? Explain in detail design rules in CMOS VLSI design. [8]

OR

- Q4 a) Explain in detail static and Dynamic Power dissipation. What are the Components which makes power dissipation in CMOS circuit? [8]
b) Explain the following terms [8]
i) Body effect ii) Hot Electron effect iii) Velocity saturation
iv) Power delay product.
- Q5 a) Design Ten bit shift Register using VHDL programming. Also write the Testbench for the same. [10]
b) Explain different types of wait statements used in VHDL, with suitable example. [8]

OR

- Q6 a) Draw FSM for JK flip flop and T-flipflop. Write VHDL code for the Same, which will cover all state table conditions. Also write Testbench. [10]
b) Explain Generate statement in VHDL programming with the help of suitable example. [8]

SECTION-II

- Q7 a) Compare EPROM, PAL, CPLD, FPGA and ASIC. [8]
b) Explain the following terms [8]
i) CLB ii) UCF iii) GRM iv) EDIF

OR

- Q8 a) Explain the difference between logic implemented in CPLD and logic implemented in FPGA. [8]
b) Explain Antifusible Generic FPGA architecture. [8]
- Q9 a) What are the stuck open and stuck short faults? Also, explain stuck at 1 and stuck at 0 fault with an example. [8]
b) What is Test Access Port? Draw and explain the state diagram of TAP Controller. [8]

OR

- Q10 a) Define Fault Coverage. Explain Logical and Physical faults in detail. [8]
b) What is the need of Boundary scan check? Explain boundary scan architecture. [8]
- Q11 a) Explain Clock skew with an example. How to minimize the effect of clock skew? [8]
b) What are the different Power Distribution Techniques available for the VLSI Design? [10]

OR

- Q12 a) What are the wire parasitic? How it affect the performance in the VLSI chip design? [6]
b) Write short notes on [12]
i) EMI immune design ii) Clock Jitter iii) Off chip connections

UNIVERSITY OF PUNE
[4364-574]
B.E. Examination-2013
Digital Image Processing(Elective-I)
(2008 pattern)

Time-Three hours

Maximum Marks-100

Total No. of Question=12

[Total no. of printed pages= 4]

Instructions:

- (1) Answer question number 1 or 2,3 or 4, 5 or 6 from Section-I. Answer question number 7 or 8,9 or 10 and 11 or 12 from Section-II,
- (2) Answers to the two sections should be written in separate answer books.
- (3) Figures to the right indicate full marks.
- (4) Draw neat sketches whenever required.
- (5) Use of calculator and graph paper is allowed

SECTION-I

Q.1

- (a) Briefly explain the technique for measurement of modulation Transfer Function (MTF) of the human vision system using modulated sine-wave grating and sketch the typical response curve for the MTF. How does one confirm that the human vision response is logarithmic function of input intensity? (8)
- (b) A three bit image has the following gray level distribution.

Gray Level	G_0	G_1	G_2	G_3	G_4	G_5	G_6	G_7
Number of pixels	400	700	1350	2500	3000	1500	550	0

Determine gray level distribution for the output image using Histogram equalization procedure. (8)

OR

Q.2

- (a) With reference to relation between pixels, explain
- (i) 4-connectivity
 - (ii) 8-connectivity
 - (iii) Mixed connectivity
- Explain with suitable example where the concept of connectivity is used in Image processing. (8)

- (b) Briefly explain the meaning of following. (8)
- | | |
|--------------------------------|----------------------------------|
| (i) Mean and Variance of Image | (ii) Standard deviation of image |
| (iii) Histogram of Image | (iv) Image Texture |

Q.3

- (a) A 2 X 2 block of images is given as

$$image = \begin{bmatrix} 20 & 13 \\ 20 & 01 \end{bmatrix}$$

Determine the DTC coefficients. (8)

- (b) Explain in details Chromatic adaptation, colour and Optimal thresholding. (8)

OR

Q.4

- (a) Compare following image transform techniques using simplicity, energy compactation and computational effort, as parameters.

- (i) K.L. Transform
- (ii) Discrete Fourier Transform
- (iii) Discrete Cosine Transform
- (iv) Hadamard Transformation

Indicate specific application areas in Image processing for the above transforms. (8)

- (b) Explain in detail RGB, YIQ & HIS models for colour Images. (8)

Q.5

- (a) Explain the meaning of terms Gray resolution and Spatial resolution in the image digitization. Illustrate the effect on image quality by reducing the spatial resolution. The image intensity function is given by

$$f(x, y) = A + A \cos \pi(3x + 4y)$$

Determine the optimum size of pixels for proper image digitization. (9)

- (b) Explain in details frequency Domain smoothing and sharpening filters. (9)

OR

Q.6

- (a) Briefly explain following Image Enhancement methods, indicating their typical application areas. (9)

- (i) Contrast Stretching
- (ii) Median Filtering
- (iii) Unsharp masking

- (b) Explain the meaning of lower spatial frequencies and higher spatial frequencies in the image. What are techniques for filtering it? (9)

SECTION-II

Q.7

- (a) With the help of neat block diagram illustrate different steps in image compression/decompression, indicating various types of redundancies removed of various stages. (9)
- (b) A simple 4 X 4 Image is represented by following matrix. (9)

$$\begin{bmatrix} 20 & 140 & 100 & 20 \\ 20 & 140 & 100 & 20 \\ 240 & 140 & 240 & 240 \\ 240 & 140 & 240 & 240 \end{bmatrix}$$

- (i) Determine the entropy of image.
(ii) Coding redundancy in the image.
(iii) Generate a simple Huffman code-book for various gray level in the image.

OR

Q.8

- (a) Explain with the neat block diagram working of two dimensional transform coding and discuss considerations for choice of transform for image compression. (9)
- (b) Explain the following terms: (9)
- (i) Data redundancy and compression ratio.
(ii) Inter pixel Redundancy
(iii) Image Entropy

Q.9

- (a) With the help of suitable masks explain the following. (9)
- (i) Point detection
(ii) Line detection
(iii) Edge detection
- (b) What is Hough transform? Explain how it is used to determine the co-linearity of points. (7)

OR

Q.10

- (a) Explain Morphological Image Processing w.r. To Dilation, Erosion, Opening Closing on Binary images. (9)
- (b) Explain Chain codes and B-Splines for boundary representation. (7)

Q.11

- (a) A skilled medical technician is charged with the job of inspecting a certain class of monochrome images generated by electron microscope. To facilitate the technician uses Image processing aids. However when technician examines the images, he finds following problems. (12)
 - (i) Presence of bright isolated dots that are not of interest.
 - (ii) Lack of sharpness
 - (iii) Poor contrast

Propose and explain sequence of preprocessing steps that technician may use to overcome the above problems.
- (b) Explain the difference between Image enhancement and Image restoration. (4)

OR

Q.12

- (a) Explain any one of the following image processing applications, specifying various I.P. Algorithms which may be used. (12)
 - (i) Face Recognition
 - (ii) Industrial Inspection
 - (iii) 'X-Ray' baggage inspection for security.
- (b) Explain in detail Sampling pulse degradation in Image digitization. (4)

UNIVERSITY OF PUNE
[4364-576]
B.E.(E & TC) Examination 2013
Industrial Drives and Control
(2008 pattern)

Time-Three hours

Maximum Marks-100

[Total No. of Question=12]

[Total no. of printed pages= 3]

Instructions:

- (1) Answer to the TWO sections should be written in separate answer books
 - (2) Neat diagrams must be drawn whenever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Use of logarithmic tables and non-programmable electronic pocket calculator is allowed.
 - (5) Assume suitable data whenever necessary.
-

SECTION-I

- Q.1 (a) Explain the operation of a three phase, fully controlled bridge converter with inductive load. Draw the voltage & current waveforms for $\alpha = 60^\circ$. Derive the expression for average output voltage. Plot the variation of average output voltage as a function of α . (12)
- (b) What will be the change in the above parameters if the inductive load is replaced with a resistance? (6)

OR

- Q.2 (a) Draw a simplified of an Ideal Dual Converter. Derive the condition to get the same average voltage at the output terminals of both the converters. Mention differences between the ideal and practical dual converters. (10)
- (b) With the help of a neat diagram and necessary waveforms explain the operation of four quadrant chopper. (8)

- Q.3 (a) With the help of neat circuit diagram & waveforms, explain the operation of transistorized three phase bridge inverter with star connected balanced resistive load for 180° conduction mode. (10)
- (b) Compare voltage source & current source inverters. (6)

OR

- Q.4 (a) Explain why three phase to single phase cycloconverter requires positive & negative group of phase controlled converters. Under what condition, the group work as inverter & rectifier? How the firing angles of the two converters should be controlled? (10)

(b) A three phase bridge inverter is fed from a 500 V dc source. The inverter is operated in 180 degree conduction mode & its supplying a purely resistive, star connected load. Determine the following. (6)

(1) RMS value of the output line & phase voltage.

(2) RMS value of the Fundamental components of the line & phase voltage.

Q.5 (a) Draw the equivalent circuit of a separately excited D.C. motor and write the expressions for motor torque, armature voltage and motor speed. Mention various techniques of speed control of DC motor. (8)

(b) A 230V, 800 rpm, 7A separately excited D.C. motor has an armature resistance 0.2Ω . Under rated condition the motor is driving the load whose torque is constant and independent of speed.

The speed below the rated speed are obtained with armature voltage control (with full field), and the speed above the rated speed are obtained by field control (with rated armature voltage.)

Determine:

(i) The motor terminal voltage when speed is 500 rpm.

(ii) The value of flux as a percentage of rated flux of the motor speed is 1100 rpm. Neglect the motor rotational losses. (8)

OR

Q.6 (a) With the help of a neat circuit diagram and waveforms explain the speed control of DC motor using a single phase semoconverter. Draw and explain briefly its torque-speed characteristics. (10)

(b) With the help of neat diagram explain the under & over voltage protection circuit for a DC motor drive. (6)

SECTION-II

Q.7 (a) A 4 pole 1440 rpm 3 phase induction motor is operated from a per phase voltage of 240V, 50 Hz and driving a constant torque load. Calculate the following at $f=25$ Hz, Φ_{ag} (airgap flux) = constant = 4.8

(i) Supply voltage per phase

(ii) Slip

(iii) Slip frequency

(iv) Percentage rotor loss (10)

(b) With the help of a neat circuit diagram and torque speed characteristics explain the stator voltage controlled induction motor drive. (8)

OR

Q.8 (a) With the help of an equivalent circuit explain the various performance characteristics of induction motor. (8)

(b) Explain the static Scherbius drive for slip-power recovery of induction motor. (10)

Q.9 (a) With the help of equivalent circuit explain the operation of a cylindrical

rotor motor. Derive the expression for the torque angle & developed torque.

Also plot the Torque versus Angle characteristics. (10)

(b) Explain the Brushless D.C. & A.C. Motor Drives. (6)

OR

Q.10 (a) Explain the Permanent Magnet Stepper motor Drive. (8)

(b) Explain the Constant voltage /Hertz closed loop control of Synchronous Motor. (8)

Q.11 (a) Explain briefly Energy Audit. (6)

(b) Explain the operation of Fuzzy logic based Induction motor Speed Control System. (10)

OR

Q.12 (a) Write a short note on Traction motor A.C. Drive. (6)

(b) Explain the operation of Fuzzy logic based Wind Generation System. (10)

UNIVERSITY OF PUNE

[4364]-577

B E (E & TC) Examination April- May -2013
Microwave Communication and Radar
Elective-I (2008 Pattern)

[Time: 3 Hours]

[Max. Marks: 100]

[Total No. Of Questions: 12]

[Total No. Of Printed Pages: 3]

Instructions:

- (1) *Answers to the two sections should be written in separate answer-books.*
 - (2) *Black figures to the right indicate full marks.*
 - (3) *Neat diagrams must be drawn wherever necessary.*
 - (4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
 - (5) *Assume suitable data, if necessary.*
-

SECTION -I

- Q 1a) What are microwave? Explain advantages and applications of Microwave [6]
- b) What is the waveguide? Explain the parameter of rectangular waveguide. [6]
- c) With the help diagram, explain the need coupling probes and loops [6]

OR

- Q 2a) Discuss the power losses and power transmitted in rectangular waveguide [8]
- b) Design the rectangular waveguide to propagate 10 GHz signal under dominant mode [6]
- c) Explain the advantages of waveguide over coaxial cable. [4]

Q 3 a) Describe the operation of two-hole direction coupler. Give the various parameters of the direction coupler [10]

b) Describe the operation of E-plane and H-plane tees [6]

OR

Q 4 a) Write short notes on: [10]

i) Waveguide transition

ii) Microwave attenuator

b) Explain the working of ferrite circulator and write down the applications [6]

Q 5 a) Discuss the limitations of conventional tube at microwave frequencies and explain the remedy for these [8]

b) Explain the principle of working of a Reflex klystron. Where it is used [8]

OR

Q 6 a) What is the magnetron? List of different types of magnetron. Explain how oscillations sustained in magnetron [8]

b) Draw the schematic diagram of a TWT amplifier and describe its Principle of operation. [8]

SECTION –II

Q7 a) Explain power frequently limitation of microwave bijunction transistor [8]

b) How to PIN diode be used as a microwave switch? Describe a single PIN switch in shunt and series mounting configuration [6]

c) Discuss the advantages and list the applications of a parametric amplifier [4]

OR

Q 8 a) What is varactor diode? Give its construction, working principle and explain any one application [8]

b) What is IMPATT diode? Draw the schematic diagram and equivalent circuit of the IMPATT diode. [6]

c) Discuss the difference between transferred electron devices and avalanche transit time device [4]

Q 9 a) Explain the method of measuring impedance of terminating load in microwave system [6]

b) How to power of microwave generator can be measured using bolometer [6]

c) What do you understand by Q of a cavity resonator [4]

OR

Q 10 a) Explain brief network analyzer [6]

b) Describe technique of measuring the phase shift provided by network [6]

c) Write a short note on measurement of noise factor [4]

Q 11 a) Explain the working of pulse radar with the help of block diagram [8]

b) Explain with neat diagram, how target velocity can be obtained by CW radar [8]

OR

Q12 a) Explain A-Scope and PPI displays with reference to radars. What are their limitations? [8]

b) Explain the principle and working of an MTI radar. [8]

University of Pune
B.E.(E&TC)
[4364]-578
Examination – 2013
Entrepreneurship Development
Elective-II (404185)
(2008 Pattern)

Total No. of Questions : 12
[Time : 3 Hours]

[Total No. of Printed Pages :2]
[Max. Marks : 100]

Instructions :

- (1) Answer 03 question from each section.*
 - (2) Answers to the two sections should be written in separate answer-books.*
 - (3) Figures to the right indicate full marks.*
 - (4) Use of logarithmic tables, slide rule, Mollier charts, Electronic packet calculator is allowed.*
 - (5) Neat diagrams must be drawn whenever necessary.*
 - (6) Assume suitable data, if necessary.*
-

Section I

- Q1. A) Enlist Entrepreneurs skills? Explain in brief problem-solving Model. [8]
B) Explain Characteristics of Entrepreneur. [4]
C) Explain different kinds of Entrepreneurial business. [4]

OR

- Q2. A) Define Entrepreneurship? State Advantages & Disadvantages of Entrepreneurship. [8]
B) State financial & non- financial goals of Entrepreneur. [8]
- Q3. A) Explain business activities in market economy & comment on “Concept of Cost”. [9]
B) State Advantages & Disadvantages of buying an Existing Business. [9]
- Q4. A) Define Franchise & State Advantages & Disadvantages of Owning a Franchise. [9]
B) Define Ownership? Explain the type of ownership. [9]

- Q5. A) What is a purpose of business plan? Explain the goals and objectives of business plan. [8]
B) Describe how to perform market research in five steps. [8]

OR

- Q6. A) How can Entrepreneurs with social business ideas get the financing they need to start and run a business? [8]
B) Explain briefly types of loans. State some reason a bank may reject loan application. [8]

Section II

- Q7. A) What are different steps for hiring employees. [8]
B) What are deniable leadership qualities. [4]
C) What is mean by journal & explain the types. [4]

OR

- Q8. A) State advantages and disadvantages of computerized record keeping. [8]
B) What are four main parts of an income statement? [4]
C) How can you motivate employees. [4]
- Q9. A) What is mean by break even analysis. Explain with suitable graph. [8]
B) What are the advantages of e-mail & www in business? [8]

OR

- Q10. A) How the technology is used for business. [8]
B) How experts help the company. What are types of expert. [8]
- Q11. A) Explain in what way laws protect the business and project the business and Protect consumers? [6]
B) Short note on Business Ethics. [6]
C) What are the risks and benefits of competing globally. [6]

OR

- Q12. A) What are different responsibilities of Entrepreneurs? [6]
B) Explain the strategy for growth of business. [6]
C) What are global trends for business? [6]

UNIVERSITY OF PUNE
[4364]-579
B. E.(E & TC)Examination - 2013
JOINT TIME FREQUENCY ANALYSIS
ELECTIVE-II (2008 Pattern)

[Total No. of Questions:12]
[Time : 3 Hours]

[Total No. of Printed Pages :3]
[Max. Marks : 100]

Instructions :

- (1) Answer **any three** questions from each section.
 - (2) Answers to the **two sections** should be written in **separate answer-books**.
 - (3) Black figures to the right indicate full marks.
 - (4) Neat diagrams must be drawn wherever necessary.
 - (5) Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator is allowed.
 - (6) Assume suitable data, if necessary.
-

SECTION-I

- Q1 For a Harr wavelet function $\psi(t)$
- a) Derive and plot the magnitude response [8]
 - b) Plot $\psi(2t - 1)$ and its magnitude response [4]
 - c) Find $\langle \psi(2t), \psi(2t) \rangle$ [3]
 - d) Find orthogonal projection of $\psi(t)$ on subspace W_1 [3]

OR

- Q2 Explain:
- a) Time Bandwidth product b) Uncertainty principle [18]
 - c) Phasors and its use in modifying phase information of underlying signal.

Q3 Do the analysis of the given signal $x(t)$ using 2 Band Harr filter bank [16]

Structure:

$$x(t) = \begin{cases} t & 0 \leq t \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

OR

Q4 Draw and explain tilings of [16]

a) STFT b) Wavelet transform c) Wavelet Packet transform

Q5 Signal $s(t)$ is defined as:

$$s(t) = \begin{cases} t/2 & 0 \leq t \leq 2 \\ \frac{-t}{2} + 2 & 2 \leq t \leq 4 \end{cases}$$

a) Find projection of $s(t)$ so that it belongs to subspace. V_0 [8]

b) Find projection of $s(t)$ so that it belongs to subspace. V_1 . Prove [8]

that $V_1 = V_0 \oplus W_0$

OR

Q6 a) Write the effect of downsampler with downsampling factor of 2 using

z domain relationship between input and output [8]

b) Prove for Harr 2-band filter bank synthesis filters are power [8]

complementary

SECTION-II

Q7 Using perfect reconstruction of conjugate quadrature filter banks, determine analysis low pass filter coefficients of Daub-4? Using the alias cancellation condition also find out the analysis HP and Synthesis LP and HP coefficients of Daub-4. [16]

Q8 a) Derive and explain dilation equation in frequency domain. [8]

b) Explain:

i) Meyer Wavelets ii) Battle Lemarie Wavelets [8]

Q9 Given $x[n] = \{1, 0, -2, 1, 1, 0, 1, 2\} \in V_3$ Develop complete Wavelet packet [16]

tree till V_0 and calculate the coefficients along with bases-

$\{W_{0,K}^{[0]}, W_{0,K}^{[1]}, \dots, W_{0,K}^{[7]}\}$. Prove perfect reconstruction using the leaves

from 0^{th} subspace.

OR

Q10 Using modified perfect reconstruction condition of conjugate quadrature [16]

filter banks determine the analysis filter coefficients for JPEG 2000 popular 5/3 biorthogonal tap

Q11 Given $x[n] = \{8, 7, 5, 3\} \in V_2$ Develop wavelet lifting scheme, using MRA [18]

framework decompose the signal to the 0^{th} subspace. Show perfect reconstruction. Clearly show 'split', 'update' and 'predict' stages and their outputs. Show how the computations take in place. Also explain the advantage of Lifting Scheme in application of Image compression

OR

Q12 Write notes on [18]

- a) Scalogram
- b) Signal denoising
- c) Speech compression

UNIVERSITY OF PUNE

[4364]-580

B. E.(Electronics & Telecommunication)Examination - 2013
MICROELECTROMECHANICAL SYSTEM & SYSTEMS ON CHIP
ELECTIVE II (404185)
(2008 Course)

[Total No. of Questions:12]
[Time : 3 Hours]

[Total No. of Printed Pages :3]
[Max. Marks : 100]

Instructions :

- (1) Answer *any three* from each section.
- (2) Answer *Q1 or Q2, Q3 or Q4, Q5 or Q6* from section I and *Q7 or Q8, Q9 or Q10, Q11 or Q12* from section II.
- (4) Neat diagrams must be drawn wherever necessary.
- (6) Assume suitable data, if necessary.

SECTION-I

- Q1 a) Explain basic working principal of MEMS microphone. Give its specifications. [8]
- b) What do you mean by scaling in electromagnetic force? Justify: [8]
electromagnetic force is $F \propto l^4$ for cross section area of conductor.

OR

- Q2 a) Explain working principal and performance parameters of Gyroscope? [8]
- b) Explain in detail wet etching process in MEMS fabrication. [8]
- Q3 a) Explain working principal of silicon piezoresistors? [8]
- b) Explain principal planes of a silicon crystal. What characteristics do silicon principal planes offers? [8]

OR

- Q4 a) Explain physical properties of silicon. Which silicon compounds are used in MEMS manufacturing. [8]
- b) Explain the concept of a) Mobility b) Resistivity in context to Piezo crystal. [8]
- Q5 a) Explain working principal of thermal sensor. Where these are employed? [9]
- b) Which properties of magnetic sensor are used in MEMS fabrication? Explain working principal of magnetic sensor. [9]

OR

- Q6 a) Explain working principal of biosensor for measurement of blood Glucose concentration in a patient. [9]
- b) Explain working principal of RF sensors with example? [9]

SECTION-II

- Q7 a) Explain SoC architecture in detail. [8]
- b) Explain main characteristics of VLSI technology that are leading to overall organization of microprocessors. [8]

OR

- Q8 a) Explain in detail operation and working of dataflow execution. [8]
- b) Explain in detail new ways for speeding up execution of instructions. [8]
- Q9 a) Explain code translation in a context to hardware and software. [8]

b) Explain working of PVD? Which PVD process is used in MEMS and SoC fabrication? [8]

OR

Q10 a) What is LEGAL? Explain LEGAL algorithm steps. What kind of improvement inculcated in LEGAL in context to earlier routing algorithms? [8]

b) What reliability issues are crop up in packaging? Which factors leads failures in packaging? [8]

Q11 a) Explain standard cell approach for layout synthesis problem. [9]

b) What are the issues in testing of core based systems on chip? Explain features of co-design tool. [9]

OR

Q12 a) Which features are inculcated in co-design tool? Explain design steps for co-design. [9]

b) What problems cope up in testing of Microsystems? How these problems are patched up and rectified? [9]

UNIVERSITY OF PUNE

[4364]-583

B. E. (E& TC) Examination - 2013

OPTICAL FIBER COMMUNICATION

(2008 Pattern)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II
- 2 Answers to the two sections should be written in separate answer-books.
- 3 Black figures to the right indicate full marks.
- 4 Your answer will be valued as a whole
- 5 Neat diagrams must be drawn wherever necessary.
- 6 Assume suitable data, if necessary.

SECTION –I

- | | | | |
|-----|---|---|-----|
| Q.1 | A | A graded index fiber has a core with a parabolic refractive index profile which has a diameter of 50 μm . The fiber has numerical aperture of 0.2 Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of 1.3 μm . | [6] |
| | B | Explain the terms: mode field diameter, spot size and cut off wavelength for single mode fibers. | [6] |
| | C | State and explain the advantages of optical fiber communication system. | [6] |
- OR**
- | | | | |
|-----|---|---|-----|
| Q.2 | A | A silica optical fiber with core diameter large enough to be considered by ray theory analysis has core refractive index of 1.5 and cladding refractive index of 1.47. Determine
i) the critical angle at core cladding interface
ii) the NA of the fiber iii) the acceptance angle in air for the fiber. | [6] |
| | B | Compare i) Multimode and Single mode fibers.
ii) Step index and Graded index fibers. | [6] |

- C A graded index fiber with a parabolic refractive index profile core has a refractive index at the core axis of 1.5 and refractive index difference of 1% Estimate the maximum possible core diameter which allows single mode operation at wavelength of $1.55 \mu\text{m}$. [6]
- Q. 3 A Describe the fiber structures utilized to provide: [8]
 i) Dispersion –shifted single mode fibers.
 ii) Dispersion- flattened single mode fibers.
 Also draw neat graphs to illustrate the chromatic dispersion parameter curves in each of the cases.
- B A student wishes to establish a 10 km optical fiber link that utilizes a fiber with a loss of 1.5 dB /km. The fiber is available in short pieces of 1 km each. The connectors available in the laboratory have a loss of 0.6 dB each. Determine the minimum optical power which must be launched into the fiber so as to maintain a mean optical power level of 300 mW at the detector. [8]
- OR**
- Q. 4 A Explain the term Critical bend radius with reference to optical fibers. Estimate the critical bend radius of curvature at which large bending losses would occur for a $62.5/125\mu\text{m}$ MMSI fiber with core refractive index of 1.5 relative refractive index difference $\Delta=3\%$ and operating wavelength of 820 nm. [8]
- B Explain the following mechanisms associated with optical fibers: [8]
 i) Scattering Losses
 ii) Absorption Losses
- Q. 5 A Radiative and non – radiative recombination lifetimes of the minority carriers in the active region of a DH InGaAsP-LED are 60 ns and 100 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is $1.55 \mu\text{m}$ at a drive current of 40 mA. [8]
- B Sketch and explain: [8]
 i) Insertion loss characteristics for jointed fibers with various types of misalignments.
 ii) Various mismatch losses at the fiber joints.

OR

- Q. 6 A A silica multimode step index fiber has a core refractive index of 1.46 Determine the optical loss in decibels due to Fresnel reflection at a fiber joint with: [8]
- i) A small air gap between the fiber end faces.
 ii) An index-matching epoxy which has a refractive index of 1.40 between the fiber end faces.
 If may be assumed that the fiber axes and end faces are perfectly aligned at the joint. Comment on the results.
- B A GaAlAs laser diode has $500\text{ }\mu\text{m}$ cavity-length which has an effective absorption coefficient of 10 cm^{-1} . [8]
 Calculate the optical gain at the lasing threshold for the following cases:
 i) For uncoated facets the reflectivities are 32% at each end.
 ii) If one end of the laser is coated with dielectric reflector with 90% reflectivity. Comment on the results.

SECTION II

- Q. 7 A A Silicon photodiode has quantum efficiency of 70% when photons of energy $1.5 \times 10^{-19}\text{ J}$ are incident upon it. [10]
- i) At what wavelength is the photodiode operating?
 ii) Calculate the incident optical power required to obtain a photocurrent of $2.5\text{ }\mu\text{A}$ when the photodiode is operating as describe above.
 iii) A silicon photodiode can be used for detection in the first transmission window only. Justify.
- B Explain the following with respect to optical receivers: [8]
 i) Shot Noise
 ii) Thermal Noise
 iii) Signal to Noise ratio in p-n or p-i-n receivers
 v) Signal to Noise ratio in APD receivers

OR

- Q. 8 A Explain the following factors limiting the speed of response of a photo diode: [10]
- i) Drift time of carriers
 ii) Diffusion time
 iii) Time constant
 A silicon p-i-n photodiode has $25\text{ }\mu\text{m}$ depletion layer width and carrier velocity $3 \times 10^4\text{ m/s}$. Determine the

- maximum bandwidth and the corresponding response time for the device.
- B An analog optical fiber system operating at a wavelength of $1.3 \mu\text{m}$ has a post detection bandwidth of 5 MHz. Assuming an ideal detector and considering only quantum noise on the signal, calculate the incident the incident optical power necessary to achieve an SNR of 50 dB at the receiver. [8]
- Q. 9 A Components chosen for a digital optical fiber link of overall length 10km and operating at a 20M bit/s using an RZ code are given below: [8]
- i) LED capable of launching an average power of 0.1 mW at $0.85 \mu\text{m}$ [including connector loss into a $50 \mu\text{m}$ core diameter graded index fiber]
 - ii) Fiber attenuation 2.5 dB/km and
 - iii) Requires splicing every 2 km with a loss of 0.3 dB per splice. There is also a connector loss at the receiver of 1.5 dB.
 - iv) The receiver requires mean incident optical power of -46 dBm in order to give the necessary BER of 10^{-10}
 - v) Predicted safety margin of 6 dB.
- Write down the optical power budget for the system and hence determine its viability.
- B Explain following terms with reference to analog link: [8]
- i) Carrier of Noise Ratio
 - ii) Carrier Power
 - iii) Preamplifier noise.
 - iv) Relative Intensity noise
- OR**
- Q. 10 Write short notes no: [16]
- i) Rise Time Budgeting.
 - ii) Multichannel transmission techniques.
- Q. 11 A Explain in detail the architecture of EDFA. [8]
- B A 2 X 2 biconical tapered fiber coupler has: [8]
- i) Input Optical power level of $P_0 = 100 \mu\text{W}$.
 - ii) Output powers at the other three ports P_1 , P_2 and P_3 are $80 \mu\text{W}$, $65 \mu\text{W}$ and 6.3 nW respectively.
- Calculate, coupling ratio, Excess loss, & Return loss.

OR

Q. 12

Write short notes on:

[16]

- i) Semiconductor optical Amplifiers
- ii) Noise in optical amplifiers

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

UNIVERSITY OF PUNE
[4364]-585
B. E. (E&TC) Examination - 2013
SPEECH PROCESSING
(2008 Pattern)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.*
- 2 *Answers to the two sections should be written in separate answer-books.*
- 3 *Figures to the right indicate full marks.*
- 4 *Draw neat diagrams must be drawn wherever necessary.*
- 5 *Assume suitable data, if necessary.*

SECTION -I

- | | | | |
|-----------|---|--|-----|
| Q.1 | A | Explain LTI model for speech production system? What are their limitations? | [8] |
| | B | What is pitch? Explain the method of finding pitch of speech signal using AMDF method? What are advantages of finding pitch period using AMDF method over autocorrelation methods? | [8] |
| OR | | | |
| Q.2 | A | Explain the terms
1) Vowels 2) Diphthongs. 3) Semivowels 4) nasals
5) fricatives 6) Stops 7) Affricates 8) Consonants | [8] |
| | B | Explain the technique to separate voiced and unvoiced region of speech signal using energy and ZCR. | [8] |
| OR | | | |
| Q.3 | A | Explain Levinson –Durbin recursive algorithm for calculation of predictor coefficients. | [8] |
| | B | Explain the basic principal of linear predictive analysis? Explain the method of finding LPC coefficients using autocorrelation method. | [8] |
| OR | | | |
| Q. 4 | A | Explain the method to determine pitch period of speech signal using LPC analysis? | [8] |
| | B | Explain the basic principal of linear predictive analysis? | [8] |

Explain the method of finding LPC coefficients using covariance method.

- Q. 5 A What is MFCC? Explain the method to calculate MFCC using block diagram? [10]
 B With the help of block diagram explain homomorphic speech processing? [8]

OR

- Q. 6 A Explain the method to evaluate the formants of speech signal using cepstrum analysis. What is importance of formants in speech processing? [8]
 B What is complex cepstrum? Explain the procedure to evaluate cepstrum of a speech signal? State properties of complex cepstrum. [10]

SECTION II

- Q. 7 A What is speech enhancement? Explain the spectral subtraction method of speech enhancement technique in detail. [8]
 B Compare different speech enhancement techniques. [8]

OR

- Q. 8 A What is Wiener filter? Explain the method of speech enhancement using Wiener filtering. [8]
 B Explain the method of speech enhancement by re-synthesis and compare with other methods. [8]

- Q. 9 A What are three basic problems associated with HMMs, Give their solution [6]
 B Draw and explain, HMM based isolated word speech recognition system. [8]
 C Write the compact form representation of HMM model (λ). [2]

OR

- Q. 10 A Draw and Explain, isolated digit recognition system using Dynamic time warping. [8]
 B Compare Speaker Identification system with Speaker Verification system. [4]
 C State different distortion measures used for Automatic Speech Recognition system. [4]

- Q. 11 A Draw and Explain Speaker Identification system. Also explain different performance measurement parameters used for speaker recognition. [9]

- B List out different features used for speaker recognition system and explain. [9]
- OR**
- Q. 12 A Explain Text-to-Speech conversion system with block schematic? State different applications of TTS. [9]
- B Explain different issues and challenges for speaker recognition system? What will be the probable solutions to resolve issues, Explain. [9]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

UNIVERSITY OF PUNE
[4364]-586
B. E. (E/TC) Examination - 2013
Television & Video Engineering
(2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 *Answer three questions from section I and three questions from section II.*
- 2 *Answers to the **two sections** should be written in **separate answer-books**.*
- 3 *Neat diagrams must be drawn wherever necessary.*
- 4 *Assume suitable data, if necessary.*
- 5 *Use of electronics pocket calculator is allowed*
- 6 *Black figures to the right indicate full marks.*

SECTION -I

- Q.1 A Draw a neat sketch of composite video signal indicating the numerical values for different timing of various pulses used in CCIR-B standard. [6]
- B Define following terms- [6]
 1) Hue, 2) Saturation, 3) Brightness, 4) Kell factor
- C Justify why (G-Y) signal is not transmitted in color TV transmission. [6]

OR

- Q.2 A Explain vertical & horizontal resolution. [6]
- B Draw chromaticity diagram & explain what information is obtained from it. [6]
- C Justify why the video bandwidth in CCIR-B standard is [6]

5 MHz.

- | | | | |
|-----|---|---|-----|
| Q.3 | A | Draw a neat block diagram of PAL encoder & explain function of each block. | [8] |
| | B | Explain the use of wobbuloscope in TV receiver alignments with neat sketches. | [8] |

OR

- | | | | |
|------|---|---|-----|
| Q. 4 | A | Draw a neat block diagram of color TV receiver & explain function of each block. | [8] |
| | B | State importance of TV pattern generator in receiver alignments. | [4] |
| | C | Compare high level with low level transmitter | [4] |
| Q. 5 | A | Explain the format of MAC signal used for transmission of color TV signals. State the various types of MAC signals. | [8] |
| | B | State the features of following video compression techniques- 1) MPEG-2
2) MPEG-4 | [8] |

OR

- | | | | |
|------|---|--|-----|
| Q. 6 | A | State the advantages of digital TV. Draw a neat block diagram of digital TV receiver & briefly explain function of each block. | [8] |
| | B | Discuss the different digital TV recording techniques. | [8] |

SECTION II

- | | | | |
|------|---|---|-----|
| Q. 7 | A | State the main features of HDTV. | [4] |
| | B | With suitable block diagram explain CATV system. | [6] |
| | C | Discuss a live TV coverage plan for international cricket | [8] |

in detail.

OR

- Q. 8 A State the main features of DTH system. [4]
 B With suitable block diagram explain CCTV system. [6]
 C Draw a neat block diagram of HDTV transmitter & [8]
 explain function of each block

- Q. 9 A What are the features of IPTV? Explain the architecture [8]
 of IPTV.
 B Draw a neat block diagram of wi-fi transmitter & [8]
 explain function of each block.

OR

- Q. 10 A Enlist the important specifications of mobile TV. [5]
 B Compare IPTV with internet TV. [5]
 C Explain video intercom system using neat block [6]
 diagram.

- Q. 11 A State the important specifications of DVD player . Draw [8]
 a neat block diagram of DVD player & explain function
 of each block
 B Compare the technologies used for flat panel display [8]
 used in color TV system.

OR

- Q. 12 A Compare camcoder with handycams & Digicams. [8]
 B Draw a neat block diagram of MP3 player, & explain the [8]
 MPEG audio compression formats.

[Total No. of Questions: 12]

[Total No. of Printed Pages: 2]

UNIVERSITY OF PUNE
[4364]-588
B.E. (E& TC) Examination - 2013
Artificial Intelligence
(2008 Pattern)(404190)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 *Answer three questions from section I and three questions from section II.*
- 3 *Answers to the **two sections** must be written in separate answer papers.*
- 5 *Assume suitable data, if necessary.*
- 7 *Black figures to the right indicate full marks.*

SECTION -I

- | | | | |
|-----|---|--|------|
| Q.1 | A | What a Artificial Intelligence? Explain any one applications of AI. | [6] |
| | B | What is an Agent ? Explain different types of agent along with its architecture. | [10] |

OR

- | | | | |
|-----|---|--|-----|
| Q.2 | A | Explain “Simple Reflex based agent” with the help of schematic diagram or pseudo code. | [8] |
| | B | Explain the significance of PEAS in AI. | [8] |

- | | | | |
|-----|---|---|-----|
| Q.3 | A | Write Minimax Search Algorithm for two players. How use of alpha and beta cut –offs will improve performance? | [8] |
| | B | Explain A* algorithm and write its pseudo code. | [8] |

OR

- | | | | |
|------|---|---|-----|
| Q. 4 | A | Explain hill climbing algorithm. Explain plateau, ridge, local maxima and global maxima. | [8] |
| | B | Define Heuristics. Explain the significance of Heuristic function in the informed search with suitable example. | [8] |

- | | | | |
|------|---|--|-----|
| Q. 5 | A | What is Knowledge Representation using propositional logic? Compare propositional and predicate Logic. | [9] |
| | B | Explain the working of Unification algorithm with suitable example. | [9] |

OR

- | | | | |
|------|---|--|------|
| Q. 6 | A | Explain the various steps of knowledge engineering process | [8] |
| | B | Consider the following axioms:
If a triangle is equilateral then it is isosceles. | [10] |

If a triangle is isosceles then two sides AB & AC are equal.
 If AB & AC are equal then angle B and C are equal.
 ABC is an equilateral triangle.
 I) Represent these facts in predicate logic
 II) Use resolution to prove: "Angle B is equal to angle C"

SECTION II

- | | | | |
|-----------|---|---|------|
| Q. 7 | A | Write short note on any three
i) Instance based learning
ii) Ensemble learning
iii) Inductive learning
iv) Explanation based learning | [18] |
| OR | | | |
| Q. 8 | A | What is artificial neural network? | [9] |
| | B | Explain the decision tree algorithm with suitable example. | [9] |
| Q. 9 | A | What is difference between expert system and traditional system?
Comment on the advantages and disadvantages of expert system. | [8] |
| | B | Explain the characteristics of Expert systems and explain the expert systems ELIZA and MYCIN. | [8] |
| OR | | | |
| Q. 10 | A | Explain the typical architecture of Expert System. | [8] |
| | B | What are trihedral figures(objects)? How waltz's algorithm can be applied to propagate symbolic information? | [8] |
| Q. 11 | A | Parse each of the sentences using top-down and bottom –up approach
i) Mary watered the plants.
ii) The brown dog ate the bone. | [8] |
| | B | Explain the Syntactic analysis with suitable Example. | [8] |
| OR | | | |
| Q. 12 | A | What is NLP? Explain all the five phases of NLP. | [8] |
| | B | Detail the Semantic analysis phase of Natural Language Processing(NLP). | [8] |

[Total No. of Questions: 12]

[Total No. of Printed Pages: 4]

UNIVERSITY OF PUNE

[4364]-591

B. E. (electronics & telecommunication) Examination – 2013

PLC AND PROCESS AUTOMATION (ELECTIVE IV)

(404190) (2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 *Answers to the two sections should be written in separate answer-books.*
- 2 *Black figures to the right indicate full marks.*
- 3 *Neat diagrams must be drawn wherever necessary.*
- 4 *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5 *Assume suitable data, if necessary.*

SECTION –I

- Q.1 A Explain the need of field buses, write a short note on 8
- (i) Foundation field bus
- (ii) Profibus
- (iii) CAN
- B Draw and explain the block diagram of process control & following terms 8
- with example.
- i) 1.Process variables
- ii) 2.Set Point
- iii) 3.Measured variable
- iv) 4.Manipulated variable
- v) 5.Control Element

OR

- Q.2 A A temperature sensor has a span of 30°C - 300°C . A measurement results 8
- in a value of 70°C for the temperature. Specify the error if the accuracy is
- i) $\pm 0.3\%$ full scale
- ii) $\pm 0.65\%$ of span
- iii) $\pm 0.8\%$ of reading
- What is possible temperature in each case?
- B Draw block diagram of typical SCADA systems & list components used in 8
- SCADA?
- Q. 3 A Why linearization of the sensor is necessary? Discuss various techniques 8
- used for linearization.
- B The sensor varies from 1 to 5 k Ω . Use this in op amp circuit to provide a 8
- voltage varying from 0 to 5 V as the resistance changes.

OR

- Q. 4 A What is the need of transmitter? Explain intelligent transmitter and their features? 8
- B Explain how DPT can be used for process tank level and Flow measurement? Draw Flow control loop diagram. 8
- Q. 5 A Pressure in psi is measured & converted to a voltage by a sensor according to the relationship,
 $V = 3.1 [P + 10]^{1/2} - 9.8$
 The pressure range is 0 to 30 psi and the set point is 15 psi. This voltage is provided as input to an 8 bit unipolar ADC with a 10.00 volt reference and the resulting binary is provided as input to a control computer.
 (i) Develop a linearization equations used to find the pressure from the binary input.
 (ii) What is digital value in Hex computer reads for pressure of 17.3 psi. 6
- B Discuss PID algorithm for Digital implementation. 8
- C Explain the integral windup and set point weighting concern to modification of PID algorithm. 4

OR

- Q. 6 A A temperature control system input the controlled variable as a range 0 to 4 volt. The output is a header requiring 0 to 8 volt. A PID is to be used with $K_p = 2.4 \% / \%$, $K_I = 9 \% / (\% - \text{min})$, $K_D = 0.7 \% / (\% \text{ min})$. The period of the fastest expected change is estimated to be 8 sec. Develop the PID circuit. 8
- B The PID controller is designed with $K_p = 5$,
 $K_I = 0.7 \text{ s}^{-1}$, $k_D = 0.5 \text{ s}$ and $p_1(0) = 20\%$. Calculate the controller output for below error in Fig .1 and draw a plot of the controller output. 10

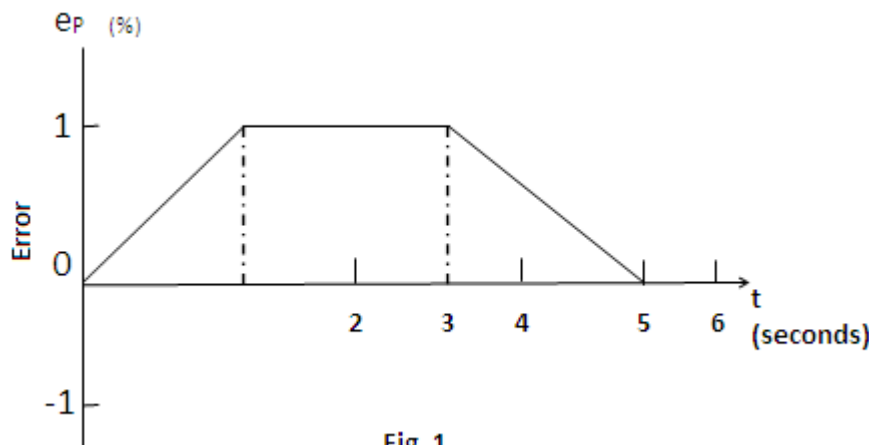


Fig. 1

SECTION II

- Q. 7 A Explain principle and various type as of flow control Valves explain with their flow characteristics? Explain the function of pneumatic Actuator with failsafe. 8
- B An equal percentage valve has maximum flow of 60 cm³ /sec and 8

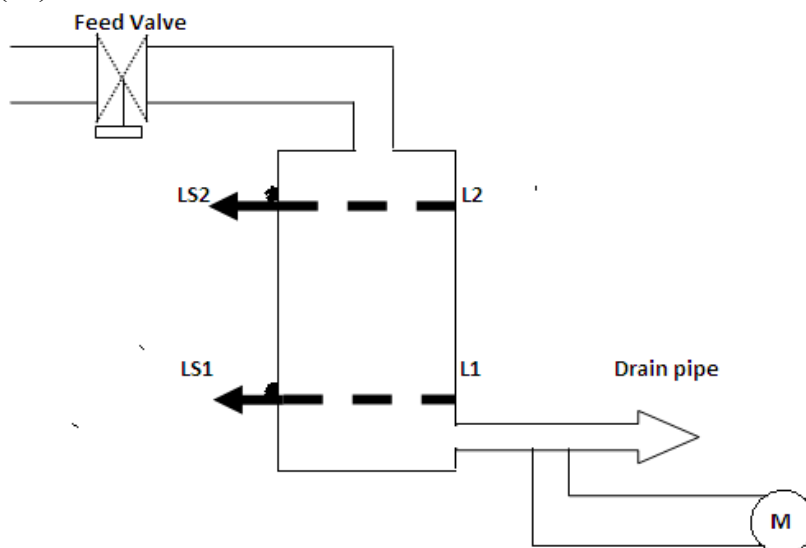
minimum flow of 5 cm³/sec. if the full travel is of 3 cm find the flow at 1.5 cm opening? Suppose a force of 400 N must be applied to open the valve. Find the minimum actuator diaphragm area if the control gauge pressure of 70 kPa (~ 10 psi) must provide this force.

OR

- Q. 8 A Explain how to find C_v to flow control Valve and find. 8
 (i) The C_v for a valve that must allow 150 gal of ethyl alcohol per min. with specific gravity of 0.8 at maximum pressure of 50 psi and
 (ii) Required valve size.
- B Explain Actuators in details. 8
 (i) Electrical Actuators
 (ii) Hydraulic Actuators
- Q. 9 A Draw the ladder diagram for the bottle filling plant. Assume that when command off is given to level control system, input valve is closed and two minutes are required for level control to full the tank an initialization? 8
- B Explain the various parts of PLC? Draw the block diagram of I/O cards of PLC? Explain various network topologies used for networking of PLCs? 10

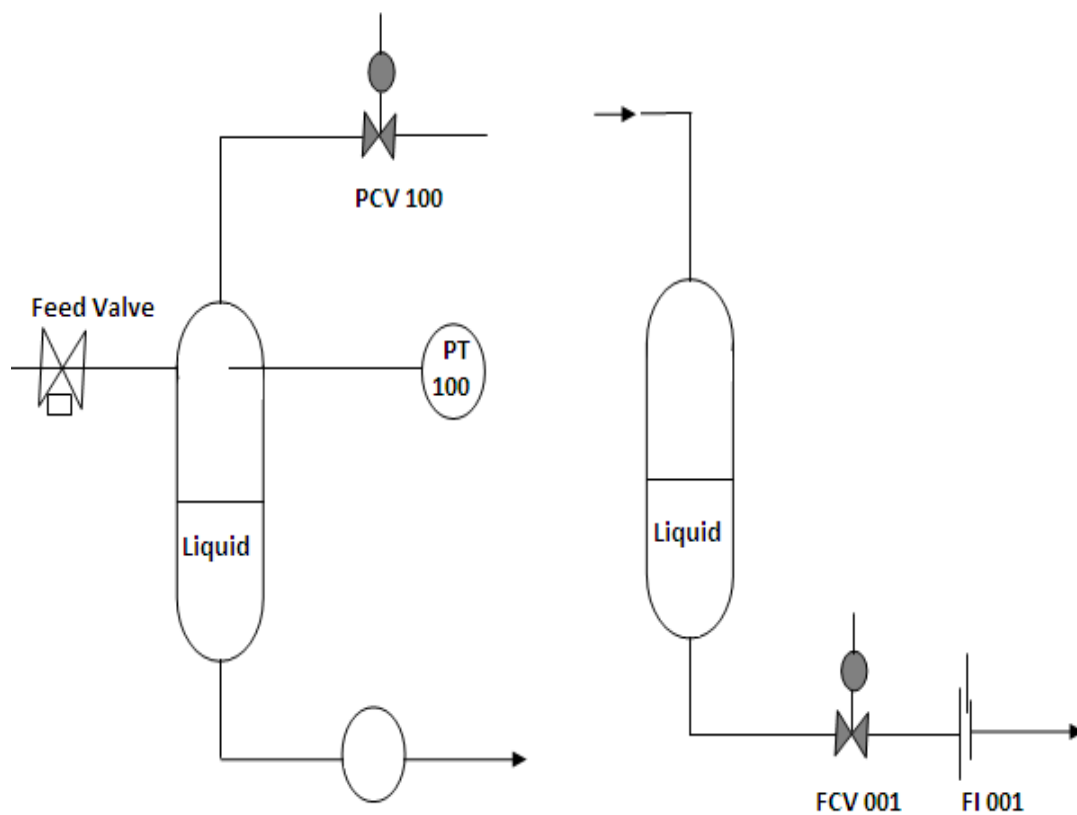
OR

- Q. 10 A The level control system of water tank has two level switches LS 1 and LS2 as shown in Fig. such that when water level > L1, LSI is ON, i.e. Design the Ladder diagram to achieve the following objective 8
 (i) When water level > L1 and < L2 motor pump is ON.
 (ii) Otherwise for all other conditions motor pump should be OFF.
 (iii) When water level is > L2 feed valve should be OFF.



- B Draw a ladder diagram for a three motor system having the following conditions: Motor 1(M1) starts as soon as the start switch is ON, after 10 seconds M1 goes OFF and M2 starts. After 5 seconds M2 goes OFF and M3 comes ON. After 10 seconds M3 goes OFF and M2 comes ON. And After 5 seconds M2 goes OFF and M1 comes ON, and cycle is repeated. 10

- Q. 11 A Explain ANN based controllers in detail. 8
 B What is fuzzy logic? Explain different Fuzzy controllers. 8
- OR**
- Q. 12 A What are the various types of converters used in process control loop? 8
 Explain following converters
 (i) I to P Converters
 (ii) I to V Converter
- B Complete the following control loop diagram: 8
 (i) Pressure Control Loop
 (ii) Flow control Loop



[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

UNIVERSITY OF PUNE

[4364]-592(A)

B. E. (E & TC) May Examination - 2013

ADVANCED TRENDS IN TELECOMMUNICATIONS

Elective – IV Q.P (2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 *Answers to the two sections should be written in separate answer-books.*
 - 2 *Black figures to the right indicate full marks.*
 - 3 *Neat diagrams must be drawn wherever necessary.*
 - 4 *Use of, electronic pocket calculator and steam tables is allowed.*
 - 5 *Assume suitable data, if necessary.*
 - 6 *Answer any three questions from Section I and any three questions from Section II*
-
-

SECTION -I

- | | | | |
|-----|----|---|------|
| Q.1 | A) | Explain self organizing and self healing features of mobile adhoc networks. | [10] |
| | B) | Describe classification of routing protocols for MANETs. | [8] |

OR

- | | | | |
|------|----|--|------|
| Q.2 | A) | Discuss in details the unique constraints and challenges for WSN implementation. | [8] |
| | B) | Explain any two cases of WSN in details with suitable diagrams. | [10] |
| Q. 3 | A) | Discuss application areas of Io T with tree diagram or | [8] |

block diagram.

- B) How RFID tag and reader communicate with each other? Explain in details. [8]

OR

- Q. 4 A) How virtualization of network resources and physical devices is imagined for Io T. [8]

- B) Discuss various standardization activities for Io T. [8]

- Q. 5 A) What is Green House effect? Explain in details. [8]

- B) Explain the idea behind Optimized and adaptive networks. [8]

OR

- Q. 6 A) Explain the concept of Green ICT. [8]

- B) Explain e-waste and its management as a means to meet Green ICT goals. [8]

SECTION II

- Q. 7 A) Distinguish between SDR and CRN in details with respect to spectrum sharing and management. [8]

- B) Discuss Cognition cycle with Spectrum Sensing, Spectrum sharing, Spectrum Mobility, Spectrum Management. [8]

OR

- Q. 8 A) What is Multi- channel Modulation? Explain in details. [8]

- B) Explain the idea behind RF/IF re-configurability. [8]

- Q. 9 A) Explain how the Turbo codes are efficient for cooperative communication. [8]

- B) Discuss various implementation scenarios and issue related to cooperative communication. [10]

OR

- Q. 10 A) Explain the conceptual structure of Cooperative Communication. [6]
- B) Discuss Cooperative Communication enable MIMO and Smart Antenna concept. [12]

- Q.11 A) What are the special requirements of Telehealthcare related to reliability, privacy and trust. [8]
- B) Discuss the regulatory and safety aspects of Telehealthcare in details. [8]

OR

- Q. 12 A) Mention any two use cases of Telehealthcare with technical details. [8]
- B) Explain the wireless devices used for Telehealthcare with their functionality. [8]

[Total No. of Questions: 12]

[Total No. of Printed Pages:4]

UNIVERSITY OF PUNE

[4364]-592

B. E. (E & TC) Open Elective IV Examination - 2013
ADVANCED SATELLITE SYSTEMS AND APPLICATIONS
(404190)(2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 Answer any three questions from Section I and any three questions from Section II
- 2 Answers to the two sections should be written in separate answer-books.
- 3 Neat diagrams must be drawn wherever necessary.
- 4 Black figures to the right indicate full marks.
- 5 Use of electronic pocket calculator and steam tables is allowed.
- 6 Assume suitable data, if necessary.

SECTION -I

- | | | | |
|------|---|--|----|
| Q.1 | A | Explain major subsystems on a satellite. | 8 |
| | B | Calculate the 'Azimuth & Elevation' angles to a geosynchronous satellite in the Indian Ocean operated by INTELSAT. The details of the earth station and the satellite are as follows:
i) Earth station latitude and longitude are 47.0° S and 0°
ii) Satellite longitude (subsattellite point) is 52.0° W | 8 |
| OR | | | |
| Q.2 | A | Compare LEO, MEO and GEO Satellite w.r.t. orbital height, velocity, orbital period and applications | 8 |
| | B | Define and explain the following terms with respect to the satellite communication:
i) Subsattellite point
ii) Latitude
iii) Hemispheres
iv) Ascending node | 4 |
| | C | The earth subtends a beam width between half power points of the antenna pattern, with an angle of 20° , when viewed from geostationary orbit. Calculate the aperture dimension and gain of a horn antenna that will provide global coverage at 4.4 GHz. Assume the aperture efficiency η_A of 60%. | 4 |
| Q. 3 | A | Explain with a neat diagram following concepts in information transmission on satellite channel using frequency modulation | 10 |

- i) Psophometric SNR improvement factor
- ii) Pre-emphasis-De-emphasis improvement factor
- iii) F.M. threshold effect in Satellite receiver and it's significance in system design

B Explain briefly the concept of Carlson Bandwidth for FM modulation. 8
 A 1KHz sinusoidal signal is to be transmitted on satellite telemetry channel using analog FM transmission. If bandwidth available is maximum of 10 KHz determine R.M.S. deviation required to get the best possible SNR at the receiver.

OR

Q. 4 A Explain why BPSK or QPSK modulation techniques are more suitable compared to QAM modulation in digital satellite communication system when working with Geosynchronous satellites 8

B With the help of neat diagram explain the basis of using Raised Cosine signal shaping for reducing ISI in digital satellite communications. Enumerate the tradeoff between possible ISI reduction and maximum bit rate which may be achieved on the above channel 10

Q. 5 A Derive step by step, the power received by an earth station P_r , from a satellite transmitter in terms of P_t - Power transmitted, G_r, G_t - Gain of transmitting & receiving antenna, respectively, losses associated with transmitting & receiving antenna & attenuation in atmosphere. 8

B The antenna on the satellite transmits at a frequency of 3875 MHz to an earth station at a distance of 39,000 km. The antenna has a 6° E-W beamwidth and a 3° N-S beamwidth. The receiving earth station has an antenna with a gain of 53 dB and a system noise temperature of 100 K and is located at the edge of the coverage zone of the satellite antenna. (Assume antenna gain is 3 dB lower than in the center of the beam). Transponder carrier power is 10 W at the input port of the transmit antenna on the satellite. 8

- a) Calculate the gain of the satellite antenna in the direction of the receiving earth station.
- b) Calculate the carrier power received by the earth station in dBW.
- c) Calculate the noise power of the earth station in 36 MHz bandwidth
- d) Hence find the C/N in dB for the earth station.

OR

Q. 6 A Discuss the importance of G/T ratio for earth station. How does it affect C/N ratio for satellite communication system? 8

B Consider that the satellite communication receiver operating at 4 GHz has the following gains and noise temperatures: 8

$$T_{in} = 30 \text{ K} \quad G_{RF} = 24 \text{ dB}$$

$$T_{RF} = 45 \text{ K} \quad G_{IF} = 30 \text{ dB}$$

$$T_{IF} = 1000K \quad T_m = 500K$$

Calculate the system Noise temperature assuming that the mixer has a gain $G_m = 0$ dB. Recalculate the system noise temperature when the mixer has a 10 dB loss. How can the noise Temperature of the receiver be minimized when the mixer has a loss of 10 dB?

SECTION II

- | | | | |
|-------|---|--|----|
| Q. 7 | A | What is the necessity of Multiple Access Techniques | 8 |
| | B | Explain TDMA frame structure and its design parameters in details. | 8 |
| OR | | | |
| Q. 8 | A | Compare FDMA & CDMA techniques used in satellite communication system with respect to their parameters and performance characteristics. | 8 |
| | B | Three identical earth stations access 54 MHz bandwidth transponder using FDMA. The saturated output of the transponder is 60 W and transponder is operated with 3 dB output backoff. The bandwidth of earth station signals are
Station A 25 MHz
Station B 15 MHz
Station C 10 MHz
Find power level at the output of the transponder in dBW for each earth station signal. (Assume the transponder is operating in its linear region) | 8 |
| Q. 9 | A | Define and explain the meaning of VSAT? Explain various VSAT network configurations with the help of a hub. List the applications of VSAT. | 8 |
| | B | Explain concept of Satellite Television Technology. Discuss its deployment in Indian scenario w.r.t. service providers, satellite, frequencies etc. | 10 |
| OR | | | |
| Q. 10 | A | With reference to VSAT earth station engineering , discuss
i) Antennas and their mechanisms.
ii) Transmitters and Receivers. | 10 |
| | B | Write a short note on Digital Direct Broadcast Satellite. | 8 |
| Q. 11 | A | Draw and explain the block diagram of signal generation in GPS satellite. | 8 |
| | B | Write a short note on any one of the following satellite applications
i) Remote Sensing
ii) Resources Mapping | 8 |
| OR | | | |

Q. 12	A	Draw and explain the block diagram of simplified GPS receiver	8
	B	Write a short note on any one of the following satellite applications	8
		i) Data Acquisition Systems	
		ii) Weather Forecasting	