[Total No. of Questions: *12*] **[Total No. of Printed Pages:** *3*]

UNIVERSITY OF PUNE

[4363]-10

T. E. (*Electronics/electronics and Telecommunication Engg***)**

Analog Integrated Circuit Design and Application (2003 Course)

[Time: *3* **Hours]** **[Max. Marks: 100]**

Instructions:

1 *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*

2 *Neat diagrams must be drawn wherever necessary.*

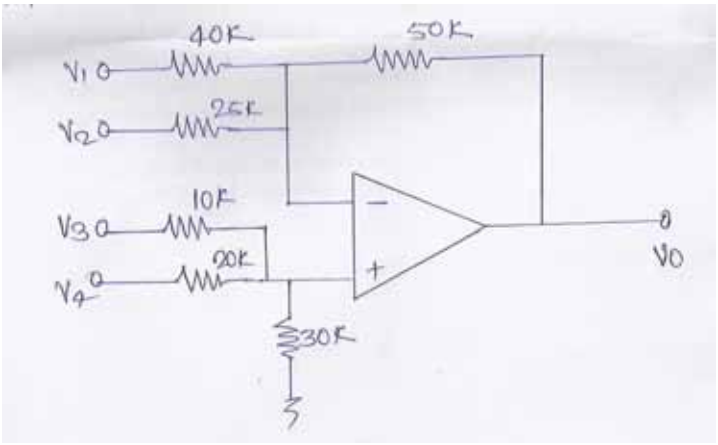
3 *Figures to the right indicate full marks.*

4 *Use of logarithmic tables and electronic pocket calculator is allowed.*

5 *Assume suitable data, if necessary.*

SECTION -I

Q.1	A	Define & Explain following Opamp parameters with their measurement techniques. 1. Input Bias Current. 2. Input Offset Current 3. Input Offset Voltage 4. CMRR 5. PSRR 6. Slew Rate	12
	B	Explain the frequency response of opamp?	6
		OR	
Q.2	A	What is frequency compensation? Explain internal and external frequency compensation in detail	10
	B	Explain virtual ground concept with opamp circuits?	8
Q. 3	A	Explain the summing and differencial amplifier using opamp with derivation of output voltage.	8
	B	Design the opamp ckt which can give the output as. $V_0 = 2V_1 - 3V_2 + 4V_3 - 5V_4$.	8
		OR	
Q. 4	A	Find the output of following circuit.	8



	B	An integrator using opamp has following component values. R1 = 1k, Rf = 100k and C_f=0.1uf. A 1kHz square wave applied to integrator. The amplifier uses ± 15V supply and output saturates at ± 14V if input alternates between ± 5V then 1) Determine the maximum Change in o/p 2) Determine the maximum slew rate.	8
Q. 5	A	Design a circuit (Window Comparator) to monitor an input voltage. Turn the indicator when input goes outside the range of 4.5V - 5.5V	8
	B	Write short note on 1) Peak detector 2) Clipper and clamper using opamp	8
		OR	
Q. 6	A	A system uses ON-OFF temperature controller. Temperature is to be maintained between 25°C to 30°C, the temperature transducer generates the voltage of 0.5v at 25 C and 30 V at 25°C. heater is operated through relay of 12V, 100mA. Design suitable circuit opamp.	10
	B	Define and explain following performance parameters of sample and hold circuit. 1) Aperture time 2) Acquisition time 3) Hold step	6
		SECTION II	
Q. 7	A	Draw and explain function generator using IC8038?	6
	B	Draw and explain operation of square wave generator using Op-amp with waveforms? Derive the expression for frequency and duty cycle generated? Explain the modification for Duty cycle control?	10
		OR	
Q. 8	A	Explain frequency to voltage converter and draw the	8

		neat diagram using VFC32?	
	B	Design a FSK generator sing IC 555 for logic 1 = 1070Hz and Logic 0=1270Hz	8
Q. 9	A	Compare active and passive filters?	6
	B	Explain the Band pass and Band stop filter? How higher order can be obtained?	6
	C	Give the advantages and disadvantages of active filter	6
		OR	
Q. 10	A	Design Band Stop filter for F1=500Hz and F2=5KHz	6
	B	Draw and explain the operation of sallen and key LPF filter using op-amp.	6
	C	Explain the various approximations used in active filters?	6
Q. 11	A	Discuss various techniques for analog multiplier? Explain the following applications of multipliers 1) Squaring Circuit 2) Frequency doublers	8
	B	Design a PLL for lock range F1=20Khz, Fc=5Khz, F0=40Khz? Explain it as FM/FSK demodulator	8
		OR	
Q. 12	A	Explain what is PLL with its operation? Explain the following parameters 1) Lock Range 2) Capture Range 3) Pull in Time	8
	B	Design A VCO as FM generator using 566 for Δf=10KHz and fc=100KHz? Draw the suitable circuit.	8

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T. E. (E&T.C/Electronics)(Sem.-I)
INFORMATION THEORY AND CODING TECHNIQUES
(2003 Course)

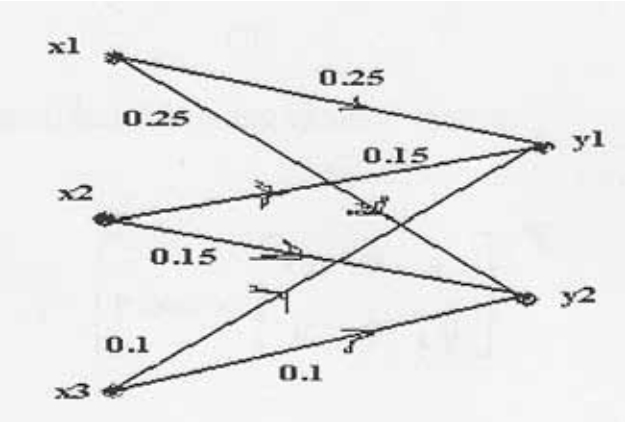
Total No. of Questions :12 **[Total No. of Printed Pages :4]**
[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

(1) Answer any three question from each section.
(2) Neat diagram must be drawn wherever necessary.
(3) Black figures to the right indicate full marks.
(4) Assume suitable data, if necessary.

SECTION-I

Q1. Find the MI for the channel & explain types of channel. [8]



b) for the given channel matrix, find out the mutual information given that P(X1)=0.6, P(X2)=0.3, P(X3)=0.1 [8]

P(Y/X)	Y1	Y2	Y3
X1	½	½	0
X2	½	0	½
X3	0	½	½

OR

Q2.

a) Apply Shannon Fano coding for all messages ensembeled using 3 letters= 1,-1,0 & Probabilities -0.3 0.12 0.12 0.12 0.08 0.07 0.07 [8]
b) Apply Huffman;s coding for messages given and find the coding efficiency 0.45 0.15 0.08 0.08 0.08 0.04 0.1 0.1 [8]

Q3.

a) A voice grade telephone channel has a bandwidth of 3400Hz if the signal to noise ratio on the channel is 30db. Determine the capacity of the channel, if the above ratio channel is to be used to transmit 48kbps of data, determine the minimum SNR required for the channel [8]
b) Explain the sphere packing problem in information capacity theorem. [8]

OR

Q4.

a) A channel has following channel matrix.

$$[P(y/x) = \begin{bmatrix} 1-P & P & 0 \\ 0 & P & 1-P \end{bmatrix}$$

Find, Channel diagram. If source has equally likely outputs, compute probability associated with the channel outputs for p=0.2 [8]
b) An ideal communication system with average power limitation & WGN has the bandwidth of 1MHz & S/N=10.
   1) Calculate channel capacity
   2) If S/N ration dropped to 5 then what bandwidth is required for same capacity? [8]

Q5.

a) For a(7,4) linear block code, generator matrix is given by

$$\begin{vmatrix} 1000 & 101 \\ 0100 & 111 \\ 0010 & 010 \\ 0001 & 010 \end{vmatrix}$$

1) Obtain parity check matrix
2) Calculate dmin
3) Calculate all the code words [10]
b) Explain ARQ techniques [8]

OR

Q6.

a) Obtain generator matrix and parity check matrix for(7,3) systematic cycle code verify the result with syndrome [12]
b) Compare the syndrome decoding techniques with maximum likelihood decision rule based on decoding. [6]

SECTION-II

Q7.

a) Explain Virterbi's algorithm with the suitable example [6]
b) Comment on:
   1) Distance bound
   2) Performance bound related to the convolutional codes. [5]
c) What are unger bock's TCM design rules. Explain asymptotic coding gain [5]

OR

Q8.

a) A rate 1/3 convolution encoder has generating vectors as g1=(110), g2=(111), g3=(011).
   1) Sketch the encoder.
   2) If the input message sequence is 10110, determine the output sequence of the encoder.
   3) Draw the state diagram and trellis diagram. [10]
b) Design a(3,1) cyclic repetition code and its decoding method. Find the corrected code words for 1) 010 [6]

Q9.

a) Find minimal polynomial of $GF(2)^3$ GF(8) whose transfield is GF(2) with primitive polynomial
   X^3+x+1. [8]
b) What is cryptography technique? Explain public key cryptography technique in detail. [8]

OR

Q10.

a) Compare the performance of the following systems with optimum system (ideal system)
   1) Amplitude modulation (SSB, DSB)
   2) Frequency modulation
   3) Pulse code modulation (PCM) [10]

b) Consider the (31,15) Reed- Soloman code,
   1) How many bits are there in a symbol of the cuuode.
   2) What is the block length in bits.
   3) What is the minimum distance of the code.
   4) How many symbols in error can the code correct. [6]

Q11.

a) What are different multiple access technique. Explain in Detail. [6]
b) Explain free space propagation model for radio link design. [6]
c) What are the wireless communication standards. Explain IS-95 in detail. [6]

OR

Q12.

a) Explain [12]
   1) Frequency reuse and polarization.
   2) Satellite transponder
   3) Earth station
b) Define E.I.R.P., antenna bandwidth and aperture efficiency of antenna. [6]

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T. E. (E &TC)/Electronics Examination 2013

DIGITAL DESIGN AND COMPUTER ORGANIZATION

(2003 Pattern)

[Total No. of Questions:] **[Total No. of Printed pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **any 3questions** from each section- I and 3 questions 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) 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. a) Draw and explain block diagram of Mealy and Moore machine. [8]

b) Explain the working of serial adder with the help of a state diagram. [8]

OR

Q2. a) What are the static and dynamic hazards? Explain how static hazards are eliminated. [6]

b) Explain ASM chart notations in detail. [6]

c) Draw FSM state machine to detect an overlapping sequence -1101- [4]

Q3. a) Explain the difference between signal and variable. [6]

b) Explain entity and process. [4]

c) Write VHDL code for 4:1 multiplexer. [6]

OR

Q4. a) Write VHDL code for 4- bit up counter with reset input. [8]

b) Explain different modeling styles of VHDL. [8]

Q5. a) Draw a flow chart and explain the Booth's Algorithm used for signed number multiplication. [8]

b) Explain the concept of look ahead carry generator .Explain its advantages. [6]

c) Draw Von Neumann Architecture. [4]

OR

Q6. a) Explain different IEEE standards for representing floating point numbers. [8]

b) Represent the following in single precision format [6]

i) -1.5 ii)15

c) What are the rules to perform multiplication and division of floating point numbers. [4]

SECTION –II

Q7. a) Explain with suitable example execution of a complete instruction using single bus organization. [12]

b) Differentiate between stack and queue. [4]

OR

Q8. a) Explain following addressing modes with suitable examples. [12]

i) Immediate addressing mode.
ii) Direct addressing mode.
iii) Indirect addressing mode.
iv) Register addressing mode.
v) Index mode.
vi) Auto increment mode.

b) Explain the role of stack in execution of subroutines. [4]

Q9. a) Explain an interrupt structure with suitable example (any processor). [8]

b) Explain memory mapped I/O and I/O mapped I/O. [8]

OR

Q10. a) List out different system buses along with their features. [8]

b) Explain different bus arbitration methods. [8]

Q11. a) Explain different types of RAMs in detail. [8]

b) What are the differences between SRAM and DRAM? Explain need of refreshing in case of DRAM. [6]

c) Explain memory hierarchy. [4]

OR

Q12. a) Explain with neat sketch, concept of cache memory and also explain the role of cache controller. [10]

b) Explain functioning of CD-ROM and DVD. [8]

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[4363]-7

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

MECHATRONICS(304185)

(2003 Pattern)

[Total No. of Questions:12] **[Total No. of Printed pages :2]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1)Answers **any 3** questions from each section*

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

(3)Neat diagram must be drawn wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(7) Assume suitable data, if necessary.

SECTION-I

Q.1 a) Define the term Mechatronics. Explain the role of mechatronics in design of elevator system in detail. [10]

b) Explain different types of error involved in the measurement system. How to reduce these error. [8]

OR

Q.2 a) Explain the term static characteristics and dynamic characteristics. Explain the terms [10]

i) Speed of Response ii) measuring lag iii) Fidelity

b) Justify with suitable examples scope and importance of mechatronics with respect to interdisciplinary approach [8]

Q.3 a) Explain construction and working of LVDT. [8]

b) List any four Sensors used for pressure measurement. compare their different characteristics. [8]

OR

Q.4 a) Explain with the help of wheatstone bridge arrangement, how output voltage is calibrated in terms of force in case of cantilever beam load cell. [8]

b) Enlist different specifications of a temperature transducer for selecting [8]

it for typical application. Explain fibre optic temp transducer.

Q.5 a) Explain the role of instrumentation amplifier in signal conditioning. [8]

what is the use of wheatstone's bridge? Justify with proof.

b) Enlist the features of PIC microcontroller? Draw an interfacing of keyboard (4 × 3) with PIC 16F84 also make provision of displaying the key pressed. [8]

OR

Q.6 a) Give performance parameters for selection of DAC. Draw an interfacing to interface temperature level and displacement (mechanical) sensors with 89C51 processor. [8]

b) Draw and explain in depth PLC architecture with different functions? Draw the ladder diagram to implement AND and X- or gates. [8]

SECTION II

Q.7 a) Draw the block diagram of magnetic tape recording and reproducing system. Explain its working. [8]

b) With a neat block diagram Explain data logger and its functions. Briefly explain the function of each block. [8]

OR

Q.8 a) With necessary timing diagram Explain the communication procedure in IC^2 bus [8]

b) Enlist different components of data acquisition system. with neat diagram explain multichannel DAS. Give typical application of DAS. [8]

Q.9 a) Define the term actuator. Explain electropneumatic actuator in detail. [8]

b) Define the term control valve. Explain different factors for selection of control valve. [8]

OR

Q.10 a) List the different specifications of stepper motor. Explain in detail stepper motor as electrical actuators. [8]

b) Explain construction and working of double acting cylinder. [8]

Q.11 a) Define the term strain gauge. Explain in detail how strain gauge is used in weighing machine. [9]

b) Discuss Rotary optical encoder as mechatronics design approach. [9]

OR

Q.12 a)Define SKIP control of CD player as a mechatronics design approach. [9]

b)Design a Robotics walking machine that will execute different motions [9]

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T. E. (Electronics) Examination –2013

ELECTROMAGNETIC WAVES AND RADIATING SYSTEMS

(2003 Pattern) (304191)

[Total No. of Questions:12] **[Total No. Printed Pages: 3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

1) *Answer **any three** questions from each I and three questions 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) *Assume suitable data, if necessary*

Q.1 a) State and explain various of standard charge distributions along with their equations $\bar{E}$ *and* $\bar{D}$. [8]

b) State and explain continuity equation of current in integral from and point form. [8]

OR

Q.2 a) State and prove the Gauss's law. [8]

b) Derive electrostatic boundary conditions between two perfect dielectrics. [8]

Q.3 a) State and explain Poynting theorem. Derive the expression for power flow into the volume in terms of power dissipated into the volume and energy stored into the volume. [8]

b) If the magnetic field $\bar{H} = [3xcos\beta + 6ysin\alpha]\widehat{a_z}$ find current density $\bar{J}$ if fields are invariant with time. [8]

OR

Q.4 a) Write Maxwell's equations for static field. Explain how they are modified for time varying electric and magnetic field. [8]

b) Find the frequency at which conduction current density and displacement [8]

current density are equal in a medium with $\sigma = 2 \times 10^{-4}$ s/m and $\varepsilon_r = 81$.

Q.5 a) A plain wave travelling in air is normally incident on a block of paraffin with $\varepsilon_r = 2.2$. Find the reflection and transmission coefficient. [8]

b) Derive the wave equations starting from Maxwell's equation for lossless dielectric as well as for lossy dielectric? Also obtain Helmholtz equations for the same. [10]

OR

Q.6 a) Define polarization of waves. Which are the different types of polarizations Explain in details. [8]

b) Explain the concept of uniform plane wave. Prove that for a uniform plane electromagnetic wave the electric and magnetic field are mutually perpendicular to each other. [10]

SECTION - II

Q.7 a) What is matched load? Why matching of load is important on a line. Also explain the terms of refection coefficient and voltage standing wave ratio (VSWR). [8]

b) Calculate the primary constants of transmission line having $Z_0 = 692 \angle -12^0\ \Omega$ and $\gamma = 0.0363 \angle 78^0$ at f= 1 kHZ. Also calculate velocity and wavelength [8]

OR

Q.8 a) Find the expression for Z_0 in terms of T section equivalent parameters for finite line. [8]

b) What is quarter wavelength ($\lambda/4$) transformer matching? How it can be used as impedance inverter. [8]

Q.9 a) Show that the radiation resistance of Hertzian dipole is 80 $\pi^2 \left(\frac{dl}{\lambda}\right)^2$ [8]

b) Explain the concept of Hertzian dipole and write down the field equations (E_r , E_θ and H_φ) for the same. [8]

OR

Q.10 a) Write a short note on antenna parameters (Any four). [8]

b) An antenna has radiation resistance of 72Ω, a loss resistance of 8 Ω and a power gain of 12dB. Determine antenna efficiency and directivity. [8]

Q.11 a) Given a linear, uniform array of 10 isotropic elements with a separation of λ/4 between the elements, find the directivity in dB for broadside array and end fire array. [8]

b) Write a short note on (any two) : [10]

1) Micro strip antenna

2) Turnstile antenna

3) Horn antenna

OR

Q.12 a) What is antenna array? Compare Broadside array with End fire array. [8]

b) Write a short note on (any two) : [10]

1) Parabolic reflector

2) Yagi-Uda antenna

3) Slot antenna