Total No. of Questions : 12]

SEAT No. :

P3677

[Total No. of Pages :4

[4758] - 901
T.E. (E & TC)
DIGITAL DESIGN AND COMPUTER ORGANIZATION
(2003 Course)

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

Instructions to the candidates:

1) ***Answer any 3 questions from section-I and 3 questions from section -II.***
2) ***Answers to the two sections should be written in separate answer-book.***
3) ***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) Design and implement a 3 bit synchronous counter which goes through the following states 1-3-5-7-1. **[8]**

b) Analyze 'D' latch as an asynchronous circuit constructed with NAND gates. **[8]**

OR

Q2) a) Draw an ASM chart and state diagram for the circuit shown in fig. (1). **[8]**

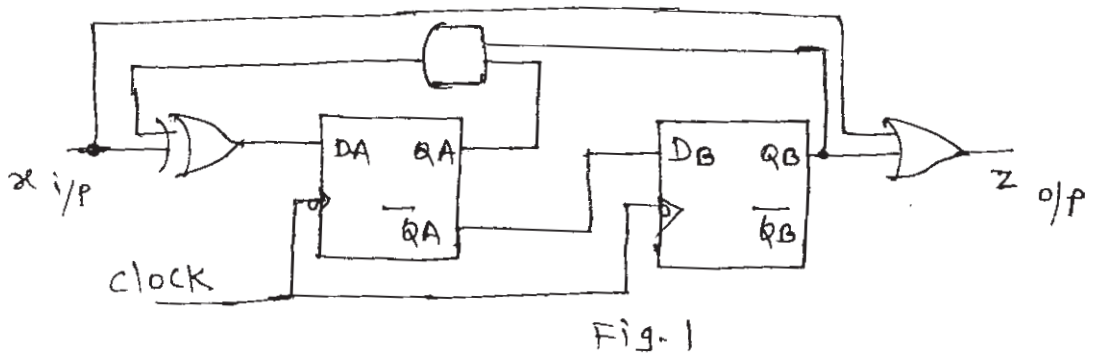

Fig. 1

P.T.O.

b) Explain following terms **[8]**

i) Structural modeling

ii) Behavioral Modeling

Q3) a) Write VHDL code in structural modeling style for full subtractor using two 4:1 Mux. **[8]**

b) Write vhdl code for 4 bit bidirectional shift register. **[8]**

OR

Q4) a) Write VHDL code for synchronous and asynchronous reset D flip flop. **[8]**

b) Explain following statements used in VHDL with suitable example: **[8]**

i) IF

ii) Case

iii) process

iv) with select

Q5) a) Explain Booth's algorithm for 2's compliment multiplication with the help of suitable example. **[10]**

b) Multiply the following numbers using bit pair recoding method **[8]**

Multiplicand 0111 (15)

Multiplier 10110 (-10)

OR

Q6) a) Explain IEEE excess-127 floating point single precision format and convert the Following decimal number in the above format. **[8]**

i) -69

ii) 59.8741

b) Explain detail integer division, restoring and non restoring division algorithm using suitable example. **[10]**

SECTION - II

Q7) a) What is subroutine nesting? What is parameter passing? Explain one of the methods to pass parameter. **[8]**

b) Write control sequence for execution of the instruction. ADD (R3), R1 using single bus Organization. **[8]**

c) What is assembler command? Write two examples. **[2]**

OR

Q8) a) Explain the following: **[8]**

i) Branching

ii) Conditional code

b) Explain the following in brief with suitable examples: **[8]**

i) Indirect addressing

ii) Indexed addressing

c) Explain immediate addressing mode with suitable 1 example. **[2]**

Q9) a) Draw and explain I/O interface for an input device. **[8]**

b) Explain Direct Memory Access in detail. **[8]**

OR

Q10)a) Explain the interrupts in handling multiple devices modes in following: **[8]**

i) Vectored interrupt

ii) Interrupt nesting

b) Explain keyboard interface circuit in detail. **[8]**

Q11)a) Explain with neat diagram and timing diagram the synchronous DRAM. **[8]**

b) Explain memory interleaving and explain one of the methods to address multiple module memory system. **[8]**

OR

Q12)a) Draw and explain organization of 64K ×8 memory module, using 16K×1 static memory Chip. **[8]**

b) Write short note on memory Hierarchy and Direct mapping. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P4286

[Total No. of Pages :4

[4758] - 902
T.E. (E& T.C.)
ANALOG INTEGRATED CIRCUITS DESIGN AND APPLICATIONS
(2003 Course)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the following related to Dual input balanced output differential amplifier **[8]**

i) Operation in Common mode and Difference mode

ii) Transfer Characteristics

b) The dual input balanced output difference amplifier has following specifications. Rc = 2.5kΩ, R_E = 4.8kΩ, $R_{b1} = R_{b2} = R_b$ = 50Ω, +Vcc = +10V, -VEE = -10V, β = 100, V_{BE} = 0.8V. Assume h_{ie} = 1.1kΩ. **[8]**

Calculate:

i) Q-point values

ii) Voltage gain

iii) Input & Output Resistance

OR

Q2) a) Explain any two level shifter circuits used in op-amp. **[6]**

P.T.O.

b) Write short notes on **[10]**

i) V_{BE} Multiplier Circuit

ii) Widlar Current Source

Q3) a) An Op-Amp has a slew rate of 5V/μs. Find the rise time for an o/p voltage of 10V amplitude resulting from a rectangular pulse input if the op-amp is slew-rate limited. **[6]**

b) Define the following characteristics of an Op-Amp. **[4]**

i) CMRR

ii) Input Bias Current

iii) Slew Rate

iv) Input Offset voltage

c) Explain the frequency response of op-amp. **[6]**

OR

Q4) a) Explain the differential amplifier using op-amp with derivation of output voltage. **[8]**

b) What is the need of frequency compensation? Explain any two methods of frequency compensation. **[8]**

Q5) a) Design a practical integrator using Op-Amp IC 741C to satisfy the following specifications: Assume Vcc = +15V. **[8]**

i) 3-dB cut-off frequency = 1.5kHz

ii) DC gain = 10

Sketch the frequency response of the circuit.

b) Explain grounded load V to I converter with necessary derivation. **[6]**

c) Explain Clipper circuits using op-amp. **[4]**

OR

Q6) a) Design a practical differentiator to differentiate an input signal that varies in frequency From 10Hz to 500Hz. Draw its frequency response. **[8]**

b) Compare the salient features of an Integrator and Differentiator using Op-Amp. **[4]**

c) Draw a neat diagram of three inputs inverting summing amplifier using op-amp & obtain expression for output voltage. **[6]**

SECTION - II

Q7) a) Explain the operation of inverting comparator with appropriate output waveforms. **[6]**

b) Explain Peak detector using op-amp. **[6]**

c) Design an inverting Schmitt Trigger circuit whose V_{UT} and V_{LT} are $\pm$ 5V. Draw input and output waveforms. Assume op-amp saturates at $\pm$ 13.5V. **[6]**

OR

Q8) a) Explain the requirements of an Instrumentation amplifier. **[4]**

b) Derive the output voltage for 3 Op-Amp Instrumentation amplifier. **[6]**

c) Explain the positive precision Full wave rectifier using op-amp with appropriate waveform. What modifications should be done in the above circuit to get negative output? **[8]**

Q9) a) Design a wide band pass filter for the following specifications Quality factor Q = 3, Pass band gain = 04, Centre Frequency = 1 KHz. **[8]**

b) Explain the working principle of an oscillator. Explain Wein-bridge oscillator using op-amp. **[8]**

OR

Q10)a) Explain how the comparator can be used as a square and triangular function generator. Derive the equation of output frequency. **[8]**

b) Draw the neat diagram of F to V converter using IC9400 and explain its operation. **[8]**

Q11)a) Explain the operation of PLL using a neat block diagram. Define the terms Centre frequency and capture time related to PLL. **[8]**

b) Write a short notes on **[8]**

i) Log Amplifier

ii) Frequency synthesizer using PLL.

OR

Q12)a) Calculate output frequency f_o, lock range and capture range of PLL if the timing parameters are $C_T = 0.1\,\mu f$, $R_T = 1k\Omega$. The filter capacitor is $10\,\mu f$. **[6]**

b) Write a short note on Sallen and Key second order active Low Pass Filter. **[6]**

c) Compare active and passive filters. **[4]**

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Total No. of Questions : 12]

SEAT No. :

P4287

[Total No. of Pages :3

[4758] - 903
T.E. (E & TC)
ADVANCED MICROPROCESSORS
(2003 Course) (End Semester) (304188)

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

Instructions to the candidates:

1) ***Answers the Q.1 or Q.2 and Q.3 or Q.4 and Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 from section II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams should be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Draw and explain 8086 architecture in detail. **[8]**

b) Write a 8086 microprocessor assembly program to reverse the accepted user string. also find the length of string. **[8]**

OR

Q2) a) Explain need of memory segmentation. **[4]**

b) Explain the different addressing modes of 8086 microprocessor. **[6]**

c) Write a 8086 microprocessor assembly program to convert the user input string into upper case letter. **[6]**

Q3) a) State the important features of virtual and protected mode of 80386 microprocessor. **[8]**

b) What is pipeline hazards? Explain branch prediction. **[8]**

OR

P.T.O.

Q4) a) Explain virtual memory, also describe paging mechanism. **[8]**

b) Draw and explain 80386 programmers model in protected mode detail. **[8]**

Q5) a) Draw and explain functional block diagram of DMA controller in detail. **[10]**

b) Explain keyboard interfacing in detail. **[8]**

OR

Q6) a) Describe block diagram of PC hardware-mother board. **[10]**

b) Explain CDROM interfacing in detail. **[8]**

SECTION - II

Q7) Write short notes on any three. **[18]**

a) USB

b) EISA

c) PCI

d) VXI

OR

Q8) a) Draw and explain 8 bit DAC interfacing to a parallel port. Also write program for the same. **[10]**

b) List the specification of EISA bus. **[8]**

Q9) a) What is shell and shell programming? **[8]**

b) Explain device driver, also explain the structure of MS DOS device driver. **[8]**

OR

Q10)a) What is TSR? Explain TSR with suitable example. **[8]**

b) Explain file management in OS. Explain file attribute and file structure in detail. **[8]**

Q11)a) Compare RISC and CISC microprocessors. **[8]**

b) What are the features of ARM7? **[8]**

OR

Q12)a) Draw and explain ARM architecture. **[8]**

b) Explain ARM programmers model. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P3678

[Total No. of Pages :5

[4758] - 904
T.E. (E & TC/Electronics)
ELECTROMAGNETIC WAVES & RADIATING SYSTEMS (EWRS)
(2003 Course)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***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 is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Attempt Q.1 or 2, Q.3 or 4, Q.5 or 6 from section I and Q.7 or 8, Q.9 or 10, Q.11 or12 from section II.***

SECTION - I

Q1) a) Define Electric flux density $\overline{D}$. State & prove the differential form of Gauss's law. **[8]**

b) Derive the relationship between magnetic flux density $\overline{B}$ & vector magnetic potential $\overline{A}$. **[8]**

OR

Q2) a) What is Laplace equation? Derive expression for parallel plate capacitor using Laplace's equation. **[8]**

b) What is continuity equation. Derive it's integral & differential form. Explain its significance. **[8]**

Q3) a) State & explain Maxwell's equations in differential & integral form. **[8]**

b) A parallel -plate capacitor with plate area of $5cm^2$ and plate separation of 3mm has a voltage $50 \sin 10^3 t$ volts applied to its plates. Calculate the displacement current assuming $\varepsilon = 2\varepsilon_o$. **[10]**

OR

P.T.O.

Q4) a) Explain the terms conduction current density & displacement current density. Derive the expression of $\nabla \times H = J + \frac{\partial D}{\partial t}$. **[8]**

b) The E & H field in free space are given by **[10]**

$$E = \frac{50}{P} \cos\left(10^6 t + \beta z\right) a_\phi \ V/m$$

$$H = \frac{H_o}{P} \cos\left(10^6 t + \beta z\right) a_p \ A/m$$

Express these in phasor form & determine the constants H_o & β such that the fields satisfy Maxwell's equations.

Q5) a) Define & explain in detail. **[8]**

i) Intrinsic impedance

ii) Loss tangent

iii) Attenuation constant

iv) Phase constant

b) In a lossless dielectric for which $\eta = 60\pi$, $\mu_r = 1$ and $H = -0.1 \cos(\omega t - z) a_x + 0.5 \sin(\omega t - z) a_y$ A/m, calculate ε_r & ω. **[8]**

OR

Q6) a) Explain the following terms. **[8]**

i) Skin effect

ii) Skin depth

iii) Skin resistance

iv) dc resistance

b) In a nonmagnetic medium $E = 4\sin\left(2\pi \times 10^7 t - 0.8x\right) a_z \ V/m$. **[8]**

Find

i) ε_r, η

ii) The time-average power carried by the wave.

SECTION - II

Q7) a) Explain the following terms. **[8]**

i) Single stub & Double stub

ii) Impedance transformer using $\lambda/4$ line.

b) A certain transmission line 2m long operating at $\omega = 10^6$ rad/s has $\alpha = 8$ dB/m, $\beta = 1$ rad/m, & $Z_0 = 60 + j40\,\Omega$. If the line is connected to a source of $10 \angle 0^\circ$ Volts, $z_9 = 40\,\Omega$ & terminated by a load of $20+j50\,\Omega$, determine **[10]**

i) The input impedance

ii) The sending - end current

OR

Q8) a) Explain the following terms **[8]**

i) Reflection coefficient

ii) Transmission coefficient

iii) Characteristic Impedance

iv) Series & shunt Impedance

b) A lossless transmission line with $Z_o = 50\,\Omega$ is 30m long & operate at 2MHz. The line is terminated with a load $Z_L = 60 + j40\,\Omega$. If U = 0.6C on the line, find **[10]**

i) the reflection coefficient r

ii) the standing wave ratios

Q9) a) An electric field strength of $10\,\mu$ V/m is to be measured at an observation point $\theta = \pi/2$, 500km from a half-wave (resonant) dipole antenna operating in air at 50MHz. **[8]**

i) What is the length of the dipole?

ii) Calculate the current that must be fed to the antenna.

b) Explain the following antenna parameters **[8]**

i) Directivity

ii) Gain

iii) HPBW & FNBW

iv) Radiation efficiency

OR

Q10)a) A magnetic field strength of $5\,\mu$ A/m is required at a point on $\theta = \pi/2$, which is 2km from an antenna in air. Neglecting ohmic loss, how much power must the antenna transmit if it is **[8]**

i) A Hertzian dipole of length $\lambda/25$?

ii) A half-wave dipole?

b) Explain the following. **[8]**

i) Near and far field

ii) Antenna regions

Q11)a) Explain the following. **[8]**

i) Broad side array

ii) End five array

b) Explain in detail Microstrip patch antenna. **[8]**

OR

Q12) Write a short on (any 4). **[16]**

a) Slot antenna

b) Horn antenna

c) Parabolic antenna

d) Yogi-Uda antenna

e) Helical antenna

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Total No. of Questions : 8]

SEAT No. :

P4721

[Total No. of Pages : 4

[4758]-906

T.E. (Civil)

STRUCTURAL DESIGN - I

(2003 Pattern)

Time : 4 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4 from Section I and Q.5 or Q.6, Q.7 or Q.8 from Section II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of electronic pocket calculator IS: 800 and steel table is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What are the advantage and disadvantage of construction in structural steel. **[5]**

b) An I-section use as a bracket connected to flange of column as shown in fig. 1 b. Column is carrying a load of 120 kN at free end at a distance of 250 mm from the column flange. Design the welded connection. **[12]**

c) A tie member of a roof truss carries a load of 200 kN. Design a section using unequal angle with longer leg connected to gusset plate. Also design the bolted connection. **[8]**

Q2) a) Differentiate between black bolt and HSFG bolts. Explain in details with sketches. **[7]**

b) An ISLB 300 @ 37.7 kg/m secondary beam transmits an end reaction of 125 kN to the web of ISHB 400 @ 77.4 kg/m main beam. Design bolted framed connection. Top flange of both the beams are at same level. Draw the neat sketch showing design details. **[10]**

P.T.O.

c) A strut of a tower carries an axial load of 200 kN resulting due to wind load. The unsupported length of member is 3 m. Design a single angle section with welded connection and draw the sketch with design details. **[8]**

Q3) a) State and explain the design steps for the design of gantry girder. **[9]**

b) A simply supported beam of 5 m effective span carries uniformly distributed load of 30 kN/m on entire span along with a central point load of 50 kN. Compression flange of beam is laterally supported only at ends and centre of beam. The ends are restrained against torsion. Design a cross section of beam and apply usual checks. **[16]**

Q4) a) Calculate the moment resisting capacity of a built up beam comprising of ISMB 450 @ 72.4 kg/m with a flange plate of 250 mm × 12 mm one each on both flange. Also calculate maximum superimposed uniformly distributed load the beam can carry on simply supported span of 6m. The compression flange is laterally restrained throughout the length. **[12]**

b) Design cross section of a welded plate girder carrying uniformly distributed load of 120 kN/m on entire span of 18 m. The compression flange is laterally restrained throughout the length. Also design the end bearing stiffener. **[13]**

SECTION - II

Q5) a) A truss as shown in Fig. 5 a is used for an industrial building situated at Pune. The truss is covered with AC sheet. Calculate Panel point dead load, live load and wind load for the truss. Assume k1 = 1, k2 = 0.9, k3 = 1, cpe = –0.7 cpi = + 0.5 and spacing of truss = 3 m. **[15]**

b) A foot over bridge as shown in Fig. 5 b is subjected to live load of 5 kN/m^2 and dead load of 1.2 kN/m^2. The clear available width is 2.8 m and height of truss is 2 m. Design the cross beam for the bridge. **[10]**

Q6) a) For the truss shown in Fig. 5 a, panel point dead load, live load and wind load are as follows. Design members U4U5, L4L5 and U5L4. **[13]**

S.N.	Type of load	Intermediate panel point load in kN
01	Dead load	03
02	Live load	02
03	Wind load	05 (suction)

b) For the foot over bridge shown in Fig. 5 b, design the members U4U5, L4L5 and U5L4. RCC slab of 120 mm thick is provided as flooring. Clear width is 2.8 m and live load is 4 kN/m^2. **[12]**

Q7) a) A column consists of two channel sections placed face to face subjected to an axial force of 800 kN. The unsupported length is 10 m. Assuming column to fixed at both ends, design the section. Also design suitable lacing system and draw the design sketches. **[20]**

b) Explain merits and demerits of cold formed light gauge section. **[5]**

Q8) a) Design a column base for an axial load of 400 kN and bending moment of 75 kNm. A section ISHB 400 @ 77.4 kg/m is used as a column. The bearing stress in concrete is 4 N/mm^2. **[20]**

b) Explain following term with respect to light gauge section. **[5]**

i) Stiffened element.

ii) Unstiffened element.

iii) Multiple stiffened element.

iv) Flat width ratio.

v) Effective design width.

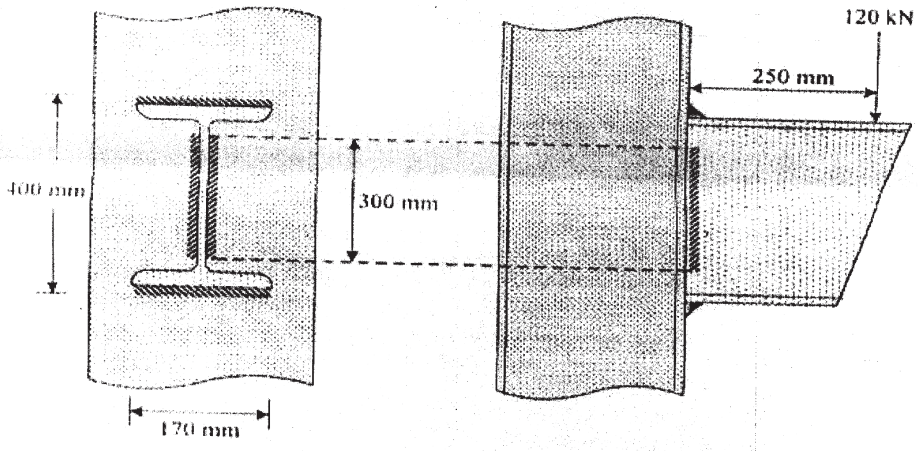

Fig. 1 b

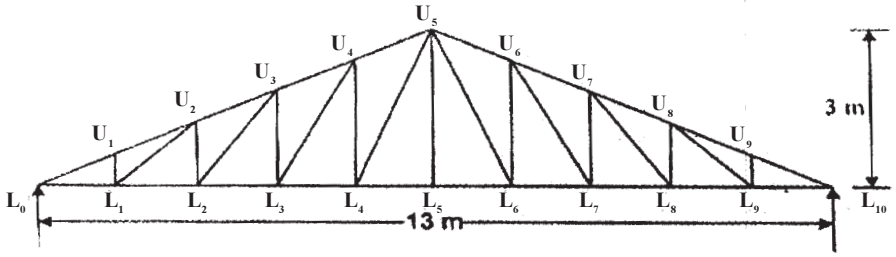

Fig. 5. a

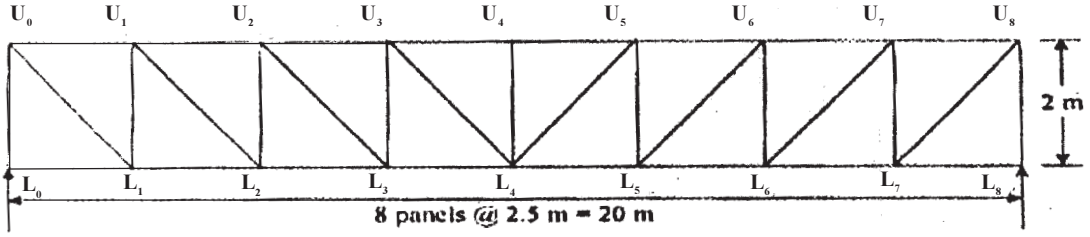

Fig. 5. b