QP Code : 31535

(3 Hours) **[Total Marks : 80**

N.B.
(1) Question No. 1 is compulsory.
(2) Attempt any three questions from remaining.
(3) All questions carry equal marks.
(3) Assume suitable data wherever necessary.

Q.1 Answer any Four of the following:
a) Explain the components of Image processing system. (5)
b) List properties of 2D DFT. (5)
c) Explain Erosion and Dilation in brief. (5)
d) Justify, "Huffman coding is a lossless compression technique". (5)
e) Why is the sum of coefficients of a high pass filter mask zero? (5)

Q.2 a) Define Image Enhancement. Explain the following enhancement operations and draw (10)
the graphs of transformation function:
1. Bit plane slicing 2. Gray level slicing

b) An 8 level image is given below. Perform Histogram equalization and draw (10)
histograms of original and equalized images.

4	6	0	3	7
2	1	5	0	3
4	2	7	0	7
1	5	4	6	0
4	7	5	4	1

Q.3 a) Perform edge detection using graph theoretic technique for the image segment shown (10)
below. Assume that edge starts from first row and ends by third row. Find the edge
corresponding to minimum cost path.

7	5	2
1	2	4
2	4	3

b) What are chain codes? Obtain the four directional and eight directional chain codes (10)
for the boundary shown below:

Q.4 a) What is Hadamard Transform ? Write a 4 x 4 Hadamard matrix and ita applications. Is (10)
H(4) ortogonal and normalized.

b) Explain the following morphological operations:- (10)
i) Hit and Miss Transformations
ii) Opening and Closing

Q.5 a) Generate the Huffman code for the sentence: "COMMITTEE" (10)
Calculate entropy of the source, average length of the code generated and coding
efficiency.

b) What are the different types of data redundancies present in a digital image? Explain (10)
them.

Q.6 Write short notes on any three of the following:- (20)
a) JPEG
b) DWT
c) Image sampling and Quantization
d) Isopreference Curves

FW-Con.12180-16.

QP Code : 31253

(3 Hours)   Total Marks: 80

N.B. 1) Question **number 1** is compulsory.
    2) Attempt **any three** from remaining five questions.
    3) Assume suitable data wherever necessary.
    4) Figure to **the right** indicates full marks.

Q1. Attempt any four from the following   (20)
a) Describe design metric and optimization challenges for embedded system
b) Explain serial peripheral interface. Compare it with parallel method
c) Explain some features of cortex R and A series which are not available in M series
d) What is on chip debugging feature? How it is accessed?

Q2a) What are communication means available for networking industrial field devices?   (10)
b) What architectural features of cortex-M3 make it low power device.   (10)

Q3a) Describe any two wireless communication means used for embedded system.   (10)
b) Describe any three RTOS scheduling methods and compare.   (10)

Q4 Design a driver-less car system. Show hardware block diagram, system working model
(FSM), software architecture module/function/drivers and their relationship, list of
components.   (20)

Q5a) Which features of c-programing may be specifically useful in embedded system? How?
                                                                                         (10)
b) Interface any sensor/display device with any controller.   (10)

Q6 Write short notes on,   (20)
a) Digital design using Verilog/vhdl: Advantages/Disadvantages
b) MSP430 architecture compared against Cortex-M3 based architecture
c) Prominent features of Cortex M3 and its impact on design, development and maintenance

FW-Con. 9944-16.

QP Code : 31293

Time: 3 Hours.   Max. Marks: 80

N.B.

1) Question No. 1 is compulsory
2) Solve any three questions from the remaining questions
3) Assume suitable data if necessary

1. Solve any four of the following   (20)
   (a) Explain interstitial and substitutional diffusion process.
   (b) Explain Electronics package reliability.
   (c) Explain the concept of clean rooms.
   (d) Explain Nuclear and electronic stopping mechanisms in ion implantation with neat diagrams
   (e) Give the steps in a standard RCA cycle during wafer cleaning

2.
   (a) What is ion implantation? Explain the process with a neat diagram.   (10)
   (b) Describe optical lithography with the help of a neat diagram.   (10)

3.
   (a) Explain the fabrication process step along with vertical cross-sectional views for CMOS inverter using twin tub process.   (10)
   (b) With neat diagram explain the Float Zone technique of crystal growth.   (10)

4.
   (a) What is the significance of Design rules? Draw layout for the CMOS inverter using lambda (λ) based design rules.   (10)
   (b) Discuss Etching methods for photoresists removal.   (10)

5.
   (a) Explain SOI fabrication using bonded SOI and smart cut method.   (05)
   (b) State advantages of BICMOS over CMOS   (05)
   (c) Describe with the help of a neat diagram Hayness-Schokley experiment for measurement of Drift Mobility of n-type semiconductor.   (10)

6. Write short notes on any four of the following   (20)
   (a) MODFET and optoelectronics devices
   (b) Nanowire transistor
   (c) Molecular Beam epitaxy
   (d) Second order effects in bipolar transistor
   (e) VLSI Technology Trends affecting Testing

FW-Con. 10599-16.

(3 hours) **QP Code : 31377**

[Total marks: 80]

N.B: (1) Answer any four questions out of six questions
    (2) Question No:1 is compulsory
    (3) Assume suitable data if necessary

1. Answer any four questions briefly: (20)
    a) Compare OSI reference model and the TCP/IP reference model
    b) Explain the authentication protocols of PPP
    c) How does Token Bucket algorithm work?
    d) Explain 'bit stuffing' in bit oriented protocols.
    e) Sketch and explain construction of graded index optical fiber

2. a) With a suitable sketch explain the transition/connection phases in Point to Point   (10)
    Protocol (PPP). Also explain the supported sets of protocols in the PPP stack.
    b) Distinguish between Go Back N ARQ and Selective Reject ARQ.   (10)
    Sketch the frame flow diagram for Go Back N ARQ and with 3 bit sequence number field and
    window size of 5, showing the following events:
      i.   Frame 0 is sent ; Frame 0 is acknowledged.
      II.   Frames 1 and 2 are sent ;Frames 1 and 2 are acknowledged
      iii.   Frames 3,4,5 are sent ; Frame 4 is damaged.
      iv.   Timer for frame 5 expires

3. a) Explain the different classes of IP addresses. Identify the class of the following   (05)
    IP addresses and give their default subnet masks
    1) 227.56.83.0 2) 114.22.43.21 3) 129.14.12.0
    b) Explain TCP connection establishment and release.   (05)
    b) Draw TST switch and three stage space division switch for N=20, n=5 and k=2   (10)
    and estimate the number of crosspoints required for both cases .
    If the above space division switch is to be made non- blocking, calculate the minimum
    number of crosspoints required.

4. a) Explain ADSL with respect to spectrum allocation and modulation technique   (10)
    b) What are the conditions to be satisfied by a good CRC generator polynomial?   (10)
    For P = predetermined divisor = 110101(LSB) and D = K bit data block= 1010001101(LSB),
    find the CRC .

5. a) Apply Dijkstra's and Bellman Ford algorithm to the given network and find the least   (10)
    cost path between source node 1 to all other nodes
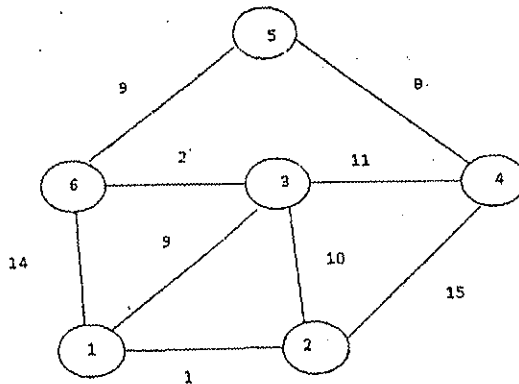
    b) Explain how TCP handles error control and flow control   (10)

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FW-Con.11654-16.

6. Write short note on: (Any TWO)   (20)
   a) Compare OSPF and BGP
   b) Berkeley socket
   c) HDLC
   d) CSMA/CD

(3 Hours) [Total Marks : 80

N.B. : 1. Question **No.1** is compulsory.
2. Solve any **three** questions out of remaining five questions .
3. Assume suitable data if necessary .

Q1 Attempt any **four** from the following : 20
a) Why separately excited DC motor is widely used as compared to DC shunt motor ? Explain
b) Give advantages of regenerative braking of DC motor compared to other methods of braking ?
c) Explain why V/F control is popular in AC induction motor control.
d) Give advantages of high frequency induction heating as compared to convertional methods of heating.
e) Compare SMPS with linear regulated power supply.

Q2 a) Explain the effect of soruce inductacne in single-phase full converter working in rectifier mode. Draw relevant output voltage waveforms Give equations which can be used to determine overlap angle μ and output DC voltage. 10
b) In a 3-phase full converter working in rectifier mode, input supply is 440V (L-L), 50Hz. If firing angle $\alpha = \pi/4$ and load current is 20 A constant with load voltage = 370 V, determine source inductance Ls and overlap angle μ. 10

Q3 a) Explain the steps involved in space vector modulation (SVM) technique used in three-phase voltage source inverter. 10
b) Explain using block diagram and transfer funtion, working of PI controller for DC-DC converter . 10

Q4 a) Give details of the state-space averaged model of DC-DC buck converter operating in continous conduction mode. 10
b) A separately excited DC motor armature winding is supplied power using single-phase full bridge converter working on 250V, 50Hz mains supply. If Ra = 0.1 Ω and armature urrent is 50 A, find the firing angle of the converter at 700RPM. Assume that field winding is supplied with rated DC voltage and motor ratings are 110V DC,1000 RPM and 75A. 10

Q5 a) Explain rotor resistance method of speed control of three-phase wound rotor induction motor. Draw speed-torque characteristics and give disadvantages of this technique. 10

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FW-Con. 11268-16.

b) Explain the following regions as related to V/F control of AC induction	10
motor.

    i) Contant torque
    ii) Contant power
Draw variations in applied voltage and motor current over entire operation
from low speed to double the rated speed of the motor.

Q6   Write short notes on :
    a) Battery charging circuit and its working
    b) Selection of battery capacity in UPS.	7
    c) Constant torque and constant power regions in control of separately excited	7
      DC motor.	6

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QP Code : 31544

(3 Hours) **[Total Marks : 80**

Instruction to the candidate if any :-
N.B.
1) Question No-1 is Compulsory.
2) Attempt any Three (03) Questions from remaining Five (05) Questions.
3) Assume suitable data wherever necessary.

Marks.

Q. No.		
Q.1	Attempt the following Questions(any4)·	
	a) Total Internal Reflection at the outer edge of the core-cladding?	5
	b) What do you mean by LP (Linearly Polarized) wave ,State difference between LP& circularly polarized wave ?	5
	c) Discuss basic block Diagram of Optical communication	5
	d) Explain the different types of losses in optical fiber communication	5
	e) Compare Dark current &optical current in Semiconductor	5
	f) What is Optical Transport network (OTN)	5
Q.2(a)	Explain Working of PIN photo diode ,Advantages of APD w.r.to Gain, &Responsively of diode	8

Q.2(b) For GIF prove that $M = \dfrac{\alpha}{(\alpha T^2)} a^2 k^2 n_1^2 \Delta$ 6

Q.2(c) Explain with neat sketch the two categories of front end amplifiers ,Discuss the possible sources of noise in optical fiber Receiver   6

Q.3(a) Explain the different types of losses in optical fiber communication ,Give the various factors responsible for optical signal attenuation &Dispersion   8

Q.3(b) Explain dispersion losses in an optical fiber ,How transmission rate calculated in dispersion   6

Q.3(c) Name five connectors used in optical fiber communication, State the difference between couplers and connectors   6

Q.4(a) Define the quantum efficiency and responsivity of photo detector, Derive an expression for the responsivity of Intrinsic photo detector   8

Q.4(b) Explain with block schematic of optical fiber soliton transmission system with optical soliton pulses (i)collision of two solitons (ii)Four stable solitons at safe separation distance.   6

Q.4(c) Difference between following term in context with optical communication(i)Optical Source &Optical Detector (ii)Coherent and Non coherent optical transmission   6

Q.5(a) Describe the structure and operation of OTDR ,Explain loss measurement by OTDR   8

Q.5(b) Explain the term protocol and Internet protocol(IP),using OSI reference model discuss implementation aspect of the (i)SONET(ii)DWDM   6

Q.5(c) Explain with components a typical WDM link and some performance measurement parameter of user interest.   6

Q.6 Write short note on(any4):   20
(a) Optical Coupler and Application
(b)SNR & Modifications of SNR for photodiode
(c)Optical safety &Service Interface
(d)Optical Switches
(e)SONET/SDH