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ELECTIVE - II
Embedded System
(1311)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub questions from each unit.
5. Figures to the right indicate full marks.

UNIT - I

1. a) Explain different characteristics of embedded system. 10
- b) Explain SPI and I²C Bus protocol. 10
- c) What is design metric and market window. Discuss why it is important for product to reach the market early in this window. 10

UNIT - II

2. a) i) Explain three stage pipeline of ARM processor. 5
- ii) Explain the role of Barrel shifter in ARM-7. 5
- b) Explain with code ARM-Thumb interworking. 10
- c) List and explain various exception of ARM-7 processor. 10

UNIT – III

3. a) List and explain various AT commands of GSM modem. 10
- b) Explain interfacing of 8 DIP switches and 8 LEDs with ARM-7 processor and write an embedded C-program for reading switch position and displaying it on LEDs. 10
- c) Explain interfacing of Thermal printer with ARM processor and write an embedded C-program to print a character on it. 10

UNIT - IV

4. a) Explain the operation of event control block in VIOS-II. 10
- b) What do you mean by context switching and list various scheduling algorithm, Explain any one. 10
- c) Explain the priority inversion problem and how to overcome it. 10

UNIT - V

5. a) Explain patching and different problems associated with it. 10
- b) Draw and explain the architecture of Linux file system. 10
- c) Draw and explain the basic architecture of a flash system. 10

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चपळ - 072

ELECTIVE - II
Digital Image Processing
(1312)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicate full marks.
5. Draw figure whenever necessary.

UNIT - I

1. Solve any two

- a) Why image transformation is needed? Explain various types of image transforms. **10**
- b) State the components image processing system. Explain in detail. **10**
- c) Explain spatial and gray level resolution. **10**

UNIT - II

2. Solve any two

- a) Give mathematical expression for ideal, Butterworth and Gaussian Filter. Also explain their role in image enhancement. **10**
- b) Suggest a suitable filter that will reduce the impact of Gaussian noise. Justify your answer **10**
- c) Explain image enhancement using histogram processing. **10**

UNIT - III

3. Solve any two.

- | | |
|---|----|
| a) Explain Arithmetic and RLC coding technique. | 10 |
| b) Discuss three basic data redundancies in DIP. | 10 |
| c) Explain in detail JPEG baseline coder decoder. | 10 |

UNIT - IV

4. Solve any two

- | | |
|-------------------------------------|----|
| a) Explain various noise models. | 10 |
| b) Write a note on pseudo coloring. | 10 |
| c) Explain RGB to HIS conversion. | 10 |

UNIT - V

5. Solve any two

- | | |
|--|----|
| a) Explain region based image segmentation. | 10 |
| b) Explain Edge detection using Sobel and Prewitt operators. | 10 |
| c) Explain Image representation using chain codes and signature. | 10 |

Seat Number

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चपळ - 075

ELECTIVE - II
Telecommunication Network Management
(1314)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** sub questions from each unit.
5. Figure to the right indicate full marks.

UNIT - I

1. a) With the help of neat diagram explain physical architecture of Telecommunication Network Management. 10
- b) Explain Network Management standards in detail. 10
- c) What do you mean by functional Model? Explain it with neat sketch. 10

UNIT - II

2. a) Explain Model based Reasoning event correlation technique in detail. 10
- b) Explain in detail about the Fault Management System. 10
- c) Explain configuration management technique in detail. 10

UNIT - III

3. a) Explain in brief about SIM and MIB used in T. N. M. 10
- b) With the help of neat diagram explain CMISE model. 10
- c) Write a brief note on Class Versus Instance. 10

चपळ - 075

UNIT – IV

4. a) With the help of neat diagram explain RMON2. 10
- b) Explain security model with respect to SNMPv3. 10
- c) Give brief account on MIB of SNMPv2. 10

UNIT - V

5. a) Explain M2 interface of ATM network in detail. 10
- b) Explain ADSL configuration and fault management in detail. 10
- c) What do you mean by DSL technology? Explain ADSL in detail. 10

Seat Number

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चपळ - 076

Television and Consumer Electronics (1290)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub questions from each unit.
5. Figure to the right indicate full marks.
6. Draw neat diagram wherever necessary.

UNIT – I

1. a) Draw composite video signal and explain the various components related to it. **10**
b) Draw the block diagram of Plumbicon Camera Tube & explain its working with typical characteristics. **10**
c) Give all the details of CCIR system B Std. Also derive an expression of video bandwidth for the standard followed in India. **10**

UNIT – II

2. a) With the help of neat diagram, explain complete working of Trinitron Colour Picture Tube. **10**
b) Explain PAL decoder with the help of neat sketch, also state merits and demerits of PAL system. **10**
c) Draw the block schematic of colour T.V. receiver and explain the function of every block in detail. **10**

UNIT – III

3. a) What is HDTV system? What are the developments made so far in this case? What are their compatibility problems? What is the principle of producing 3D effect? **10**
- b) Write short note on : **10**
- i) LCD T.V.
- ii) GPEG Compression Technique.
- c) Draw the block schematic of digital T.V. receiver and explain their working. **10**

UNIT – IV

4. a) What is magnetic recording? Explain block schematic of recording & reproduction system. **10**
- b) List out all the requirements of PA system & explain them. **10**
- c) Write short note on – **10**
- i) Hi – Fi system
- ii) Monophony & Stereophony.

UNIT – V

5. a) Draw the block diagram of DVD player & explain its operation. **10**
- b) Write short note on – **10**
- i) Solar cells and panels
- ii) Video games.
- c) Draw the block diagram of microwave oven; explain its principle of working & mention various features of it. **10**

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चपळ - 077

Telematics (1280)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** question from each unit.
5. All question carry equal marks.
6. Draw neat sketch wherever required.
7. Assume suitable data, if necessary.

UNIT - I

1. Solve **any two** of the following.

20

- a) Explain dialing mechanism and various signaling tones in automatic exchange.
- b) What is SPC? How SPC system is classified? Discuss the various configuration in which single processor is used to control all functions in SPC based exchange ?
- c) Discuss in brief the need of switching system with proper sketch describe different elements of switching.

UNIT - II

2. Solve **any two** of the following.

20

- a) Describe the basic principle of working of Time Division Time switch and why combination switch is used in practice?

- b) Discuss in details difference between single stage and multistage switching network. Draw suitable diagram to support the answer.
- c) Explain three stage switching network with blocking probability.

UNIT – III

3. Solve **any two** of the following.

20

- a) Explain in short frequency reuse, cell splitting and co channel interference.
- b) What is handoff? Explain various handoff mechanism in detail.
- c) Explain with neat diagram, basic cellular system. State the limitations of conventional mobile telephone system.

UNIT – IV

4. Solve **any two** of the following.

20

- a) Draw the reference architecture of GSM and explain the function of each block in it.
- b) With the appropriate sketch, explain forward link structure in IS-95 standard? Give key features of the same?
- c) Compare GSM and CDMA cellular system in details.

UNIT – V

5. Solve **any two** of the following.

20

- a) List The different protocols used in H-323 protocols? Explain the Internet transport protocols UDP in details.
- b) Draw the RSVP architecture and explain the concept of resource reservations & reservation merging?
- c) Explain VOIP QoS requirement and QoS solutions?

Seat Number

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Satellite Communication (1300)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions carry equal marks.
5. Answer **any two** from each unit.

UNIT - I

1. Solve **any two** of the following : 20
- a) Explain briefly Doppler Effect.
 - b) Describe antenna look angles and how are they calculated.
 - c) State Kepler's Law as applied to satellite communication. Briefly describe the orbital parameters with the help of diagram.

UNIT - II

2. Solve **any two** of the following : 20
- a) Explain what is meant by rain rate and effective path length and how this is related to specific attenuation.
 - b) Explain what is meant by cross - polarization discrimination and polarization isolation.
 - c) Explain in brief the antenna configurations used for satellite communication system.

UNIT - III

3. Solve **any two** of the following : 20

a) Solve the problems :

i) The range between a ground station and a satellite is 42,000 km. Calculate the free space loss at a frequency of 14 GHz.

ii) What is effective area of an isotropic antenna operating at 6 GHz?

b) Explain Link Power budget Equation. Calculate the gain in decibels of a 3 m Paraboloidal antenna operating at a frequency of 12GHz. Assume an aperture efficiency of 0.55

c) Compare FDMA, TDMA and CDMA.

UNIT - IV

4. Solve **any two** of the following : 20

a) What is Transponder? Explain with a neat diagram working of a basic transponder. What are the function of front end receiver?

b) Discuss design aspect for communication satellite. Explain in brief space craft sub system.

c) Explain earth station design for low system noise temperature.

UNIT - V

5. Solve **any two** of the following : 20

a) How video conferencing is possible with the application of satellite.

b) Explain INTELSAT series, in details.

c) Explain the services provided by GSM.

Seat Number

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चपळ - 079

ELECTIVE - I
Data Communication & Design
(1251)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **Any Two** from each question.
5. Assume suitable data, if necessary.
6. Figures to the right indicate full marks.

1. a) What are digital signals? How data rate can be increased in digital communication? Describe data rate limits. **10**
b) Describe data communication components. What is data representation? Explain detail. **10**
c) Describe: **10**
 - i) Through put.
 - ii) Thermal noise.
 - iii) Intermodulation Noise.
 - iv) Cross talk.
 - v) Channel capacity limit.
2. a) What do you mean by digital continuous wave modulation? List different techniques used in modems. Describe any one in detail. **10**
b) Explain in detail different modem standards. What are limitations of traditional modem. **10**
c) How modem is interfaced with computer? Illustrate EIA 232 interface. **10**

चपळ - 079

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3. a) Enlist various switching systems. Describe telephone circuit switching. State its advantages. 10
- b) Draw and explain 1 H architecture. Illustrate packet switching network. 10
- c) Write notes on. 10
- i) T1 / E1 carrier systems. ii) T3 / E3.
4. a) Enlist different data communication media. Write physical description & transmission characteristics of coaxial cable. 10
- b) Compare the following. 10
- Twisted Pair unshielded.
 - Twisted Pair shielded.
 - Coaxial.
- With respect to application and transmission characteristics.
- c) What do you mean by wireless fidelity? Draw and explain a typical fibre optic communication system. 10
5. a) What is multiple access. Explain in detail CSMA / CD. 10
- b) Write specifications of following standards. 10
- IEEE 802.3
- IEEE 802.4
- X.21
- c) Do you know different network connecting devices. List them write specification of any device available in market. Explain router. 10

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चपल - 080

ELECTIVE - I
Biomedical Instrumentation
(1252)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** questions from each unit.
5. Every questions carry equal marks.
6. Draw Figures whenever necessary.

UNIT - I

1. Solve any two.

- a) With the help of diagrams, explain principles of NMR imaging systems. **10**
- b) Draw and explain the basic pulse echo-Apparatus. **10**
- c) Write note on Medical thermography. **10**

UNIT - II

2. Solve any two.

- a) Write short note on Defibrillators. **10**
- b) Write short note on coulter counter. **10**
- c) What is need of pacemakers? Explain ventricular synchronous demand pacemaker in detail. **10**

UNIT - III**3. Solve any two.**

- | | |
|---|-----------|
| a) Write short note on microwave diathermy machine. | 10 |
| b) Explain the principles of operations of LASER. | 10 |
| c) Draw block diagram of ultrasonic therapy unit. Explain it in detail. | 10 |

UNIT - IV**4. Solve any two.**

- | | |
|---|-----------|
| a) With the help of diagram explain function of kidney. | 10 |
| b) Draw the diagram & explain the principle of dialysis in the artificial kidney. | 10 |
| c) Explain working of modern ventilators. | 10 |

UNIT - V**5. Solve any two.**

- | | |
|--|-----------|
| a) In ECG telemetry system, explain working of transmitter & receiver. | 10 |
| b) Draw and explain the implantable blood flowmeter. | 10 |
| c) What is spectro-photometry? Explain it in detail. | 10 |

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ELECTIVE - I
VLSI Design
(1251 / 1254)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicate full marks.
5. Assume data wherever necessary.
6. Please mark question number with specific bit to write answer.

UNIT - I

1. Solve any two.

- a) Define entity and architecture of VHDL module. Give the syntax rule with suitable example. 10
- b) Draw and explain the programmable logic design flow in detail. 10
- c) Write the verilog codes for 2:4 decoder using data flow description. 10

UNIT - II

2. Solve any two.

- a) Write VHDL codes for BCD to 7 segment display circuit using data flow description. 10
- b) Write VHDL codes for J-K flip-flop using behavioral description. 10
- c) Explain the procedure & function statements with suitable examples. 10

UNIT - III

3. Solve any two.

- a) Write VHDL codes for 4-bit full adder using structural description. 10
- b) Write the VHDL codes for following logic using switch level description. 10
- $$y = \overline{(a+b)} \cdot (c+d)$$
- c) Write the VHDL codes for AND gate with strong output using switch level description. 10

UNIT - IV

4. Solve any two.

- a) Write the VHDL codes for 1-bit full adder using mixed type description. 10
- b) 10

21	3	12
11	8	

myfile.txt

For myfile.txt multiply first integer by 5, second by 4, third by 3, forth by 2 and fifth by 6. The products are store in the integers Z1, Z2, Z3, Z4 and Z5 respectively. Write the VHDL codes, using file processing.

- c) What is package? Give the syntax rule for package with suitable example. 10

UNIT V

5. Solve any two.

- a) Draw and explain the product term allocator for CPLD 9500. 10
- b) Discuss the boundary scan test. 10
- c) What is simulation? Explain the different steps of simulation. 10

Seat Number

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चपळ - 083

ELECTIVE - I
Broadband Communication
(1255)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw diagrams wherever necessary.

UNIT – I

1. Solve **Any two**. 20
- a) Why control signals are necessary in circuit-switched network? Explain in detail various control signaling functions.
 - b) What is packet switching? With a proper diagram explain the importance of packet size to effectively reduce transmission time in packet transmission.
 - c) With reference to x-25 switching protocol explain the following.
 - i) sequence of events.
 - ii) Flow and error control.

UNIT – II

2. Solve **Any two**. 20
- a) With the help of neat diagram explain various fields used in LAPF – control Protocol.
 - b) Explain in detail how traffic congestion affects the through put. Draw the required graph to support the answer. Give various reasons for congestion at a router.

- c) What is frame relay approach? How it differs from x-25 protocol? Give the advantages & disadvantage of the same.

UNIT - III

3. Solve Any two. 20

- a) With reference to ISDN explain various principles and its architecture.
- b) Explain in detail ISDN-ISDN Interworking mechanism. How a call is negotiated in it?
- c) With proper sketch explain ISDN addressing and address structure.

UNIT - IV

4. Solve Any two. 20

- a) Draw the ATM cell Format and explain GFC and HEC fields in detail.
- b) What are different services provided by AAL? Explain in detail AAL Type 1 operation.
- c) With reference to ATM explain the concept of virtual channels and virtual path. What are the advantages of using virtual paths.

UNIT - V

5. Solve Any two. 20

- a) With a proper sketch explain Broadband – ISDN user network interface in detail.
- b) With a neat diagram explain Broadband ISDN protocol architecture.
- c) What are the features of SONET? Explain in detail SONET Frame Format. Give the concept of pointer adjustment.

Seat Number

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चपळ - 084

Radiation & Microwave Techniques (1210)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Assume suitable data wherever necessary.
5. Draw diagram whenever necessary.
6. Use of non-programmable calculators are allowed.
7. Use of smith chart whenever necessary.

UNIT - I

1. Attempt **any two**.

a) Derive the reflection coefficient relation

10

$$\Gamma_L = \frac{Z_L - Z_0}{Z_L + Z_0}$$

What is the relation between reflection coefficient & Transmission coefficient.

b) What is the necessity of impedance matching? Also explain single stage stub matching.

10

c) A lossless line with a Characteristic impedance of 50 ohm is terminated by an impedance Z_L . The voltage SWR maximum & minimum are found 2.5 V & 1 V respectively. The distance between successive minima is 5 cm. The line is first terminated by short & then unknown load. So, that a shift in the voltage minimum of 1.25 cm is observed towards generator. Determine load impedance using smith chart.

10

UNIT - II

2. Attempt **any two**.

- | | |
|--|----|
| a) Derive the expression for the propagation of TE wave in rectangular waveguide. | 10 |
| b) What do you know about scattering matrix. Explain properties of Scattering matrix. How it can be applied to Magic Tee. | 10 |
| c) Which are the non-reciprocal phase shifter device? Explain the property of the material used. Explain any one device which uses these properties. | 10 |

UNIT - III

3. Attempt **any two**.

- | | |
|---|----|
| a) Derive the expression of efficiency of Reflex Klystron. | 10 |
| b) Explain the negative Resistance characteristic device (Source). Explain its different operating modes. | 10 |
| c) Explain Microwave cross field tube operation. | 10 |

UNIT - IV

4. Attempt **any two**.

- | | |
|---|----|
| a) Draw & explain Set up for impedance measurement using reflectometer. | 10 |
| b) Write the drawbacks of parabolic Antenna. Explain the types of Parabolic Antennas. Write the mathematical equation for beamwidth for same Antenna. | 10 |
| c) Determine the gain, Beamwidth, capture Area of Parabolic Antenna with 10 m diameter dish & dipole feed at 10GHz. | 10 |

UNIT - V

5. Attempt **any two**.

- | | |
|--|----|
| a) Draw the block diagram of MIT Radar & explain it in details. | 10 |
| b) Explain the theory, Application of Radiometer system. | 10 |
| c) An MTI radar operates at 5 GHz with pulse repetition frequency of 800 pps. Calculate the lowest three speeds of this radar. | 10 |

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Computer Communication Networks (1240)

P. Pages : 2

Time: Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** sub questions from each unit.
5. Assume suitable data, if necessary.
6. Use of non-programmable calculator is allowed.

UNIT – I

1.
 - a) What are the different applications & technologies of infra red and light wave transmission? 10
 - b) Explain in brief the concept of virtual switching with respective to broadband ISDN. 10
 - c) Write a short note on. 10
 - i) ATM switches
 - ii) Internet over cable.

UNIT – II

2.
 - a) Explain Go- back-n and selective repeat protocols 10
 - b) Compare the data link layers between HDLC, Internet and ATM 10
 - c) What are the different wireless lan protocols? Explain any standard in details. 10

UNIT – III

3. a) Enlist all the design issue in Internet organization. 10
- b) Explain the concept of hierarchical routing with its significances. 10
- c) How control of congestion control takes place in virtual circuits subnets? Explain. 10

UNIT – IV

4. a) Explain expansion headers in IPv6 Packet format over IPv4 packet. 10
- b) Explain how switching and routing takes place in ATM network. 10
- c) Explain the structure of ATM LAN in details. 10

UNIT – V

5. a) How reliable network is maintained wing TCP? Explain with suitable flow diagram. 10
- b) Draw and explain TCP Packet format. 10
- c) Explain structure and features of ATM AAL protocol. 10

Seat Number

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Digital Signal Processing & Processors (1230)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carries equal marks.
5. Assume suitable data if required.
6. Use of non-programmable calculators are allowed.

UNIT – I

1. Solve any two :

20

- a) What is aliasing effect? How aliasing can be prevented while sampling a continuous time signal.
If a system is represented by the following difference equation:
$$y(n) = 3y^2(n-1) - nx(n) + 4x(n+1) - x(n+1), n \geq 0$$
 - a) Is the system Linear? Explain
 - b) Is the system shift invariant? Explain
 - c) Is the system causal? Explain.
- b) What are the advantages and limitation of analog signal processing over digital signal processing.
- c) What do you mean by correlation of the signal? Explain auto-correlation and cross correlation in details.

UNIT – II

2. Solve any two :

20

- a) Find the Z transform of the following :
$$x(n) = \cos n\theta u(n)$$

comment on region of convergence.

- b) Obtain the inverse Z transform for :

$$x(z) = \frac{1}{(1+Z^{-1})(1-Z^{-1})^2}$$

- c) Find $x(n)$ if $x(z) = \frac{z(1-e^{-T})}{(Z-1)(Z-e^{-T})}$

UNIT - III

3. Solve any two :

- a) Perform the circular convolution of the following two sequences using DFT & IDFT method

$$x(n) = \{1, 1, 2, 1\}$$

$$y(n) = \{1, 2, 3, 4\}$$

- b) Find the IDFT of the sequence :

$$x(k) = \{4, (1-J 2.414), 0, (1-J 0.414), 0, (1+J 0.414), 0, (1+J 2.414)\}$$

using DIF algorithm.

- c) Obtain the DFT for the sequence given below :

$$x(n) = \{1, 1, 2, 2, 3, 3\}$$

Also compute the corresponding amplitude and phase response.

UNIT - IV

4. Solve any two :

20

- a) Develop cascade and parallel realisation structures for :

$$H(z) = \frac{\frac{z}{6} + \frac{5}{24} + \frac{5}{24}z^{-1} + \frac{1}{24}z^{-2}}{1 - \frac{1}{2}z^{-1} + \frac{1}{4}z^{-2}}$$

- b) Design a digital butter worth filter that satisfies the following constraints using bilinear transformation. Assume $T = 1$ sec.

$$0.9 \leq |H(e^{j\omega})| \leq 1 \quad 0 \leq \omega \leq \frac{\pi}{2}$$

$$|H(e^{j\omega})| \leq 0.2 \quad \frac{3\pi}{4} \leq \omega \leq \pi$$

c) Design a FIR filter with

$$H_d(e^{j\omega}) = e^{-j3\omega} \quad -\frac{\pi}{4} \leq \omega < \frac{\pi}{4}$$

$$= 0 \quad \frac{\pi}{4} < |\omega| \leq \pi$$

using a Hamming window with $N = 7$.

UNIT – V

5. Solve any two.

20

- Explain in details, different types of addressing modes in a dsp processor.
- Classify the different applications of a dsp processor. Explain any one in details.
- Classify the different types of dsp processors.
 - What is pipelining. Explain in details.

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चपळ - 087

Fiber Optic Communication (1220)

P. Pages : 4

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carries equal marks.
5. Assume suitable data if necessary.
6. Use of non programmable calculator is allowed.

UNIT – I

1. Solve any two.

20

- a) What is mode, referred to the propagation of light through fiber, what are the types of modes which may exist during propagation ?
A graded index fiber with a parabolic index profile supports the propagation of 742 guided modes. The fiber has numerical aperture in air of 0.3 and core diameter of 70 μm . Determine :
 - i) wavelength of propagation.
 - ii) Maximum diameter of fiber, which gives a single mode propagation at same wavelength.
- b) What is wave theory of light & define the relative refractive index difference for optical fiber and show how it may be related with numerical aperture ? A step index fiber have an acceptance angle of 22° & relative refractive index difference of 3% estimate the N.A. & critical angle at core-cladding interface.
- c) Write notes on :
 - i) Fiber splices.
 - ii) Directional coupler.

UNIT – II

2. Solve any two.

20

a) For LED as light source used in fiber communication have

$$\eta_{int} = \frac{z}{z_r}$$

internal quantum efficiency η_{int} , prove that $\eta_{int} = \frac{z}{z_r}$, where $z \rightarrow$ total recombination life time, and $z_r \rightarrow$ radiative minority carrier life time.

List mainly used materials for the fabrication of LED in OFC ?

b) Explain main factors which limits the speed of response of photodiode ?

A photo detector in fig. 1 has following output current waveform, when a step function of input power is applied.

$$i = 10 \left[1 - e^{-t/z} \right] \text{ where } z = 10^{-6} \text{ sec}$$

Calculate detectors 3dB bandwidth ?

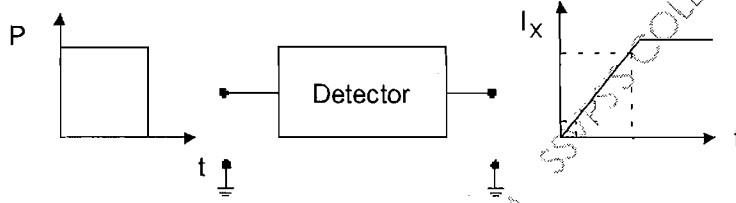


Fig. 1

c) Explain why -

- $I - V$ converter is necessary with photodiode, used as a detector.
- Surface emitting LED (surface emitters) are usually used with larger N.A. fiber.
- Distributed feedback laser diodes are the first choice as light source in OFC.

UNIT – IV

4. Solve any two.

20

- a) Write notes on :
 - i) Bending losses.
 - ii) Absorption losses.
- b) Define signal to noise ratio and explain various types of noise occurs in optical fiber system also define NEP ?
- c) The optic power reaching the receiver is $1 \mu\text{W}$. The detectors responsivity is 0.5 A/W , and its dark current is 4 nA . The temp is 27°C & receivers bandwidth is 500 MHz and $R_L = 50 \Omega$. Calculate :
 - i) The signal to noise ratio.
 - ii) Thermal noise limited SNR.
 - iii) Shot – noise limited SNR.

UNIT – V

5. Solve any two.

20

- a) Notes :
 - i) SONET.
 - ii) Optical sensors.
- b) Notes :
 - i) Optical filters.
 - ii) Integrated optics.
- c) With help of diagram, explain working of WDM in fiber communication ? What is DWDM ?
