G 5191 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Branch : Electronic and Communication Engineering/Information Technology/Applied Electronics and Instrumentation Engineering/Electronics and Instrumentation Engineering

DIGITAL SIGNAL PROCESSING (L, T, A, S)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Discuss the limitations of digital signal processing.
2. Write notes on the factors influencing the choice of realization of IIR filters.
3. Define frequency response of a filter. Discuss its role in analysis of systems.
4. Discuss the behaviour of an FIR filter based on location of zeros.
5. State and prove Parseval's theorem.
6. Discuss the properties exploited in the design of FFT algorithm.
7. What are the different representations of floating point numbers ?
8. What are the remedies for unit cycle oscillations ?
9. List four features of equiripple PCM DSP chip.
10. What is sub-band coding ? Discuss.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Realize the following IIR filter using (i) cascade form ; (ii) parallel form :

$$H(z)=\frac{10\left(1-\frac{1}{2}z^{-1}\right)\left(1-\frac{2}{3}z^{-1}\right)\left(1+2z^{-1}\right)}{\left(1-\frac{3}{4}z^{-1}\right)\left(1-\frac{1}{8}z^{-1}\right)\left[1-\left(\frac{1}{2}+j\frac{1}{2}\right)z^{-1}\right]\left[1-\left(\frac{1}{2}-j\frac{1}{2}\right)z^{-1}\right]}.$$

Or

Turn over

12. Convert the following analog IIR filter to digital IIR filter using (i) Approximation of derivatives ; (ii) Impulse invariance transformation :

$$H_a(s) = \frac{s+0.1}{(s+0.1)^2+9}.$$

(6 + 6 = 12 marks)

13. Explain the design of FIR filter using Fourier series method.

Or

14. A filter is to be designed with the following desired frequency response :

$$H_d(e^{jw}) = \begin{cases} 0, & -\pi/4 \le w \le \pi/4 \\ e^{-j2w}, & \pi/4 < |w| \le \pi. \end{cases}$$

Determine the filter coefficients $h_d(n)$ if the window function is defined as $w(n) = \begin{cases} 1, & 0 \le n \le 4 \\ 0, & \text{otherwise.} \end{cases}$

Also determine the frequency response $H(e^{jw})$ of the desired filter.

15. Obtain the circular convolution of the following signals $x_1(n) = \{1, 2, 1, -1\}$:

$x_2(n) = \{1, 2, 3, 1\}$.

Or

16. Determine the DFT of the following signal using DIT-FFT algorithm : $x(n) = 2^n$ and N = 8.

17. Explain rounding and truncation and discuss the errors resulting from rounding and truncation.

Or

18. Describe limit cycle oscillations and the techniques to prevent limit cycle oscillations.

19. Explain speech coding with a neat block diagram.

Or

20. Describe channel vocoder with a neat block diagram.

(5 × 12 = 60 marks)

G 5200 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Branch : Electronics and Communication Engineering

RADIATION AND PROPAGATION (L)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *the questions.*
Each question carries 4 *marks.*

1. Explain the methods by which the radiation patterns can be plotted ? Explain with examples.
2. Define and explain radiation resistance.
3. What is meant by array of arrays ? Explain with an example.
4. Enumerate and explain the features of Super directive arrays.
5. What is the difference between V and inverted V antenna ? Explain.
6. State and explain the limitations of Yagi - Uda Antenna.
7. Define LOS. Derive an expression for LOS.
8. What is super refraction ? Explain in detail.
9. Enumerate the requirements of a good anechoic chamber.
10. What are the methods to measure VSWR ? Explain them in brief.

(10 × 4 = 40 marks)

Part B

Answer **all** *the questions.*
Each full question carries 12 *marks.*

11. (a) Derive the field components of Oscillating Electric Dipole. Hence compute its radiation Resistance and directivity.

    (b) Explain the antenna field zones and their significances with a sketch.

Or

12. (a) Derive FRIIS transmission formula. Hence deduce an expression for Gain of an antenna.

    (b) State and prove Lorentz reciprocity theorem for antennas.

13. Derive the array factor expression for a 4 element antenna array. Explain the significance of this array.

Or

14. (a) Compare and contrast BSA and EFA .Derive the 3dB beam width expressions for both.

    (b) Enumerate and explain the features of pattern multiplication principle and Binomial array.

15. Explain the construction of a 3 element Yagi -Uda antenna array. Derive the gain expression for 2 element Yagi array. State its limitations and applications.

Or

16. Explain the radiation mechanism of a Rectangular patch antenna. Design a resonant rectangular patch so as to resonate at 3 MHz. (Assume suitable data with valid justification).

17. (a) The electron concentration at height of 300 km is 10^{11} / m^3. What is the maximum angle of incidence that can be used at a frequency of 10 MHz ? What is the horizontal skip distance if the maximum angle is used ?

    (b) A short wave broadcasting service is to be established covering a distance of 6000 km in three skips, each 2000 km long. Assume that reflection takes place at a height of 250 km and that the electron density is 5 x 10^{11} / m^3. What frequency and angle of incidence should be used? What is the MUF ?

Or

18. Draw the 2 - ray model of space wave propagation and explain it. Derive an expression for its received electric field strength.

    Write short notes on :

    1. Fading and its types 2. Gyro Frequency.

19. Draw a neat block diagram for antenna gain measurement and explain the procedure in detail.

Or

20. Draw a neat block diagram for antenna radiation efficiency measurement and explain the procedure in detail.

[5 × 12 = 60 marks]

G 5371 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 603—RADIATION AND PROPAGATION (EC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Define directivity and beam width between first nulls of an antenna.
2. What is an antenna array ? What are the reasons for using antenna arrays ?
3. What is GPR ?
4. Explain the terms ordinary and extraordinary waves in ionospheric propagation.
5. Write a note on hertzian dipole.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. State and prove reciprocity theorem.
7. Explain principle of pattern multiplication with example.
8. Explain fractal antenna.
9. What is angle of tilt ? How does it affect field strength at a distance from transmitter in case of ground wave propagation ?
10. Briefly explain monostrip antenna.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Differentiate between effective length and effective aperture of an antenna. Also derive the relationship between these two.

Turn over

(b) What are the antenna field zones.

Or

12. Define (a) front to back ratio ; (b) antenna beam efficiency ; (c) antenna temperature ; (d) radiation resistance.

13. Design a five element Dolph Chebyshev array with spacing $d = \frac{\lambda}{2}$. The pattern is to be optimum with a side lobe of 21.5 dB down the main lobe maximum.

Or

14. Explain end fire array and derive array factor, positions of nulls, positions of major lobes and HPBW of the end fire array.

15. Write a note on helical antenna working in (a) normal mode ; (b) axial mode.

Or

16. Explain the principle and working of rhombic antenna with sufficient diagrams.

17. Derive the expression for field strength and maximum distance between transmitter and receiver for space wave propagation for a flat earth.

Or

18. Explain the following terms (a) skip distance ; (b) virtual height ; (c) fading.

19. Explain measurement procedure of polarization and phase with neat diagrams.

Or

20. Explain process of measurement of impedance with sufficient diagrams.

(5 × 12 = 60 marks)

G 5385 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 604 – COMPUTER ARCHITECTURE AND PARALLEL PROCESSING [EC]

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. What are registers? State the purpose of memory address register, instruction register and program counter.
2. Give the Booth's recording and bit pair recording of the number 1000111111001101.
3. List the differences between big endian and little endian formats.
4. State the disadvantages of using branch instructions in a pipelined processor.
5. Distinguish between impact and non-impact printers.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Write the functionalities of assemblers, linkers and loaders.
7. Derive an algorithm to subtract two floating point numbers in binary.
8. Present a short note on Flash Memory.
9. Explain Multithreading in parallel processing.
10. State the purpose of 'retry logic' in a hard disk controller.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. State the CPU performance equation and analyze the parameters that affect its performance.

Or

12. Explain the addressing modes in detail with suitable examples.

Turn over

13. Describe restoring methods to perform integer division.

Or

14. What are the two techniques to speed up multiplication operations? Explain in detail.

15. Explain the different ways to organise cache memory. List its advantages and disadvantages.

Or

16. Elaborate how interrupt driven and DMA data transfers are accomplished and draw in their merits and demerits.

17. Discuss how the performance of CPU be enhanced with pipelining.

Or

18. Explain multistage multicomputers with a neat diagram.

19. Identify the components of a motherboard and explain their functionalities with a neat diagram.

Or

20. Explain the different classification of hard disks.

(5 × 12 = 60 marks)

G 5400 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 605—MICROCONTROLLERS AND APPLICATIONS (EC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Give the pin-wise signal assignment of 8051.
2. Draw the program status word and list the flags in it.
3. What is the difference between ADD and ADDC instruction in 8051 ?
4. Define step angle in stepper motor and state its necessity.
5. Give the instruction format of byte oriented file register instructions in PIC 18 with examples.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. List the advantages of a microcontroller over a microprocessor.
7. Inspite of offering on-chip program and data memory, why additional external memory interfacing provision is available in microcontroller.
8. Write a note on the vectored interrupts of 8051.
9. Develop a program to make the LED interfaced with port P1.0 blink continuously.
10. Explain the three types of memories in PIC 18 microcontroller.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Draw the internal architecture of all the I/O ports in 8051 and explain the components used.

Or

12. Describe the Von Neumann architecture of 8051 microcontroller. Highlight its advantages.

13. Discuss data memory organization of 8051.

Or

14. Develop a program to copy 25 bytes of data from 60 H to the location 40 H and shift to data up by 7 bytes.

15. Write an ALP for 8051 to generate a square wave of 70 Hz frequency on PI.2, using an interrupt for timer < jns. Assume that XTAL ~ 11.0592 MHz.

Or

16. Explain how serial communication is performed with 8051. Highlight the registers used for this.

17. Draw and explain the interfacing circuit and the functional pins of alphanumeric LCD.

Or

18. Discuss the interfacing of DAC 0808 to 8051 with a neat diagram.

19. Explain how pipelining of instructions are performed using PIC-18 controller.

Or

20. Discuss the different timers used in PIC-18.

(5 × 12 = 60 marks)

G 5437 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 606 L06 – TELEVISION AND RADAR ENGINEERING (Elective–I) [EC]

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Explain how flicker is avoided using interlaced scanning.
2. Describe the principle by which phase error is cancelled in PAL color TV system.
3. Compare LCD and Plasma display.
4. Explain the role of delay line cancellers in RADAR.
5. Describe the technique by which the frequency of a conventional magnetron is varied.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain how sync pulse separation and generation of vertical and horizontal sync pulses are carried out in a 625 line TV receiver with proper diagram.
7. Describe the features of a PAL color TV system.
8. Explain flat panel display TV receiver.
9. Draw the block diagram of IF Doppler filter bank and explain. Also show the frequency-response characteristics.
10. Describe the principle of operation of a Conventional magnetron.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Discuss on Vestigial sideband modulation for video signal transmission (625 line system) Mention its advantages in comparison with DSB and SSB modulation Schemes. Also draw the spectrum indicating the total channel bandwidth using VSB modulation

Or

12. With a neat diagram of composite video signal for 625 line video transmission, clearly show and explain the following terms with necessary dimensions.
    (a) DC component.
    (b) Pedestal height.
    (c) Blanking pulse – horizontal and vertical
    (d) Sync pulse.

13. Draw and explain the functional block diagram of NTSC coder and receiver. Mention the principle of color demodulation. Explain how the color sub carrier frequency is selected.

Or

14. What is meant by Frequency interleaving in color TV transmission? Draw the frequency spectrum in the case of a 525 line color TV system. Show the location of Picture carrier, Y signal, Chrominance information and sound carrier. Also describe color burst signal.

15. Explain a cable distribution system with proper diagram. Describe the frequencies used in cable TV. Describe the structure and application of co-axial cable.

Or

16. Describe the signal path diagram in a satellite communication system with necessary diagram indicating dimensions and frequencies. Explain modulation and transmission in satellite communication. Also describe the role of micro-controller, transport IC and forward error correction circuitry in the receiver section.

17. What is the principle of frequency modulated CW RADAR? Compare with simple CW Radar. Draw and explain the block diagram. Obtain the complete frequency-time relationship.

Or

18. Explain in detail :
    (a) Sequential lobing.
    (b) Conical scan.

19. Explain the operation of a three-cavity klystron with diagrammatic representation. Also describe the terms in a klystron amplifier :
    (a) Pulse modulation.
    (b) Bandwidth.
    (c) Tuning.

Or

20. Explain the Radar antenna parameters with relevant mathematical expressions :
    (a) Directive gain.
    (b) Power gain.
    (c) Effective aperture.
    (d) Polarization.
    (e) Aperture efficiency.

(5 × 12 = 60 marks)

G 5435 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 606 L04 – MEDICAL ELECTRONICS (Elective I) [EC]

(New Scheme – 2010 Admission onwards)

[Regular/Supplementary/Improvement]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Give the significance of Ag-AgCl electrode.
2. Draw a neat ECG waveform with labeled intervals and duration.
3. What is the usage of bed side monitor?
4. Explain the importance of bio electric amplifiers in biomedical field.
5. Briefly explain the advantages of X-ray imaging.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. With necessary diagrams, explain human circulatory system.
7. Explain different modes of operation of cardiac pacemakers.
8. Explain with a block diagram, how we can measure the potential from the muscles.
9. How isolation amplifiers are used in biomedical equipments? Give types of isolation amplifiers and compare them.
10. Briefly explain autocollimators used in X-ray imaging

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. With neat schematic explain 3 transducers used in biomedical field.

Or

12. (a) Explain PH electrode with a neat diagram.

(b) Briefly explain electrode skin interface.

(6 + 6 = 12 marks)

13. (a) Explain dc defibrillator with a neat schematic.

(b) How phonocardiography is useful in biomedical field?

(7 + 5 = 12 marks)

Or

14. (a) What is Einthoven triangle?

(b) Explain unipolar and bipolar lead systems used for ECG measurement.

(4 + 8 = 12 marks)

15. Explain with a neat block diagram, the working principle of EEG machine. Briefly explain 10-20 electrode system used for EEG measurement.

Or

16. Explain :

(a) Central monitoring system.

(b) Cardiac tachometer.

(6 + 6 = 12 marks)

17. Briefly explain :

(a) Chopper stabilized amplifiers.

(b) Instrumentation amplifiers.

(7 + 5 = 12 marks)

Or

18. Explain how electromagnetic and ultrasonic methods are used for the measurement of blood flow.

19. Discuss CT imaging technology. Give its advantages and applications.

Or

20. Explain :

(a) Ultrasound imaging.

(b) MR imaging.

(6 + 6 = 12 marks)

[5 × 12 = 60 marks]

17. Design a high-pass filter with a frequency response :

$$H_d\left(e^{jw}\right)=\begin{cases}1 \text{ for } \frac{\pi}{2}\le|\omega|\le\pi\\ 0 \text{ for } \quad |\omega|\le\frac{\pi}{2}\end{cases}.$$

Find the values of $h(n)$ for N = 11 using hamming window. Find H (z) and determine the magnitude response.

Or

18. (a) Explain the bilinear transform method of IIR filter design. (5 marks)

(b) What is wrapping effect ? (2 marks)

(c) Explain the poles and zeros mapping procedure clearly. (5 marks)

19. (a) Explain Radix - 2 DIF FFT algorithm. Compare it with DIT—FFT algorithms. (6 marks)

(b) Perform the linear convolution of the sequence.

$x(n)=\{1,-1,1,-1\}$ and $h(n)=\{1,2,3,4\}$ using DFT method.

(6 marks)

Or

20. (a) Compute the eight point DFT of the sequence by using the DIT and DIF—FFT algorithm.

$$x(n)=\begin{cases}1 & 0\le n\le 7\\ 0 & \text{otherwise}\end{cases}.$$

(6 marks)

(b) Summarize the properties of DFT. (6 marks)

[5 × 12 = 60 marks]

G 5353 **(Pages : 4)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Branch : Applied Electronics and Instrumentation/Electronics and Communication/ Electronics and Instrumentation Engineering

AI 010 602/EC 010 602/EI 010 602—DIGITAL SIGNAL PROCESSING (AI/EC/EI)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *the questions.*
Each question carries 3 *marks.*

1. Write short notes on ROC properties of Z-transform.
2. Discuss Phase delay and Group delay.
3. Give the expression for location of poles of normalized Butterworth filter ?
4. What is the principle of designing FIR filter using windows ?
5. Comment on the effect of spectral sampling.

(5 × 3 = 15 marks)

Part B

Answer **all** *the questions.*
Each question carries 5 *marks.*

6. A signal $x(n)$ is given by $x(n)=\{0,1,2,3,4,5,6,0,1,2,3\ldots..\}$.

(a) Obtain the decimated signal with a factor of 2.

(b) Obtain the interpolated signal with a factor of 2.

7. Let $x[n]$ be a causal, N-point sequence that is zero outside the range $0\le n\le N-1$.

When $x[n]$ is the input to the causal LTI system represented by the difference equation

$$y[n]-0.25\,y[n-2]=x[n-2]-0.25\,x[n],$$

the output is $y[n]$, also a causal, N-point sequence.

(i) Show that the causal LTI system describe by this difference equation represents an all-pass filter.

(ii) Given that $\sum_{n=0}^{N-1} |x[n]|^2 = 5$, determine the value of $\sum_{n=0}^{N-1} |y[n]|^2$.

8. Explain the procedure for designing analog filters using the Chebyshev approximation.

9. Apply Bilinear Transformation and Impulse invariant to $H(s) = 2/(s+2)(s+3)$ with T = 0.1 sec.

10. Find the N-point DFT of the sequence

$$x(n) = 4 + \cos^2\left(\frac{2\pi n}{N}\right) n = 0, 1, ... N-1.$$

(5 × 5 = 25 marks)

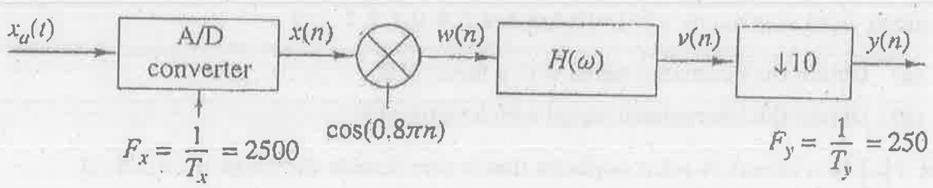
Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Explain sampling rate conversion by a rational factor and derive input and output relation in both time and frequency domain.

Or

12. An analog signal $x_a(t)$ is bandlimited to the range $900 \le F \le 1100$ Hz. It is used as an input to the system shown in fig. In this system, $H(\omega)$ is an ideal low-pass filter with cut-off frequency $F_c = 125$ Hz.



(a) Determine and sketch the spectra for the signals $x(n), w(n), v(n)$ and $y(n)$. (6 marks)

(b) Show that it is possible to obtain $y(n)$ by sampling $x_a(t)$ with period T = 4 ms.

(6 marks)

13. A causal linear shift-invariant discrete-time system has a system function :

$$H(z) = \frac{(1-0.7z^{-1})(1-j2z^{-1})(1+j2z^{-1})}{(1-0.8z^{-1})(1+0.8z^{-1})}$$

(a) Find a minimum phase system function $H_{min}(Z)$ and an all pass system function $H_{ap}(z)$ such that :

$$H(z) = H_{min}(z) H_{ap}(z).$$

(6 marks)

(b) Find a minimum phase system function $H_{min}(Z)$ and a linear phase system function $H_{lp}(z)$ such that :

$$H(z) = H_{min}(z) H_{lp}(z).$$

(6 marks)

Or

14. Explain the Type I, Type II, Type III and Type IV linear phase filters with suitable expressions.

15. A system is represented by a transfer function $H(z)$ is given by :

$$H(z) = 3 + \frac{4z}{z-(1/2)} - \frac{z}{z-(1/4)}.$$

(a) Does this H (z) represent a FIR or IIR filter ?

(b) Give a difference equation realization of this system using direct form - 1.

(c) Draw the block diagram for the direct form 2 canonic realization and give the governing equation for implementation.

Or

16. Design an analog Butterworth filter that has a 2*db* pass band attenuation at a frequency of 20 *r*/sec and at least 10 *db* stop band attenuation at 30 *r*/sec ?

Turn over

G 5347 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 601—DIGITAL COMMUNICATION TECHNIQUES (EC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. A random variable has a probability density function $f(x) = \begin{cases} \frac{5}{4}(1-x^4) & ; \quad 0 \le x \le 1 \\ 0 & ; \quad \text{elsewhere} \end{cases}$ find :

   (a) E(X).

   (b) E[4X + 2].

   (c) E[X].

2. Explain baseband digital communication system along with its block diagram.

3. A multi level digital communication system transmits one of the sixteen possible levels over the channel every 0·8 ms.

   (a) What is the minimum number of bits corresponding to each level ?

   (b) What is the baud rate ?

   (c) What is the bit rate ?

4. Sketch and interpret the eye diagram.

5. The input binary sequence to a QPSK modulator is $\{b_k\}$ = {0 1 0 0 1 0 1 1 0 1 1 0}. Sketch the transmitted phase of the carrier as a function of time.

(5 × 3 = 15 marks)

Turn over

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. How the signals are geometrically represented in N-vector space ?

7. What is correlation receiver using bank of N correlators ?

8. What is ISI ? Derive its expression.

9. A PCM system uses a uniform quantizer followed by a seven bit encoder. The bit rate of the system is 50 Mbps. What is the message bandwidth for which the system operates satisfactorily ? Determine the output signal-to quantizing nose ratio when a sinusoidal modulating wave of frequency 1 MHz is applied to the input.

10. A signal $g(t) = 10 \cos(20 \pi t) \cos(200 \pi t)$ is sampled at the rate of 250 sample/second.

    (a) Sketch the spectrum of the sampled signal.

    (b) Specify the cutoff ideal reconstruction filter so as to recover $g(t)$ from $g_{\delta(t)}$.

(5 × 5 = 25 marks)

Part C

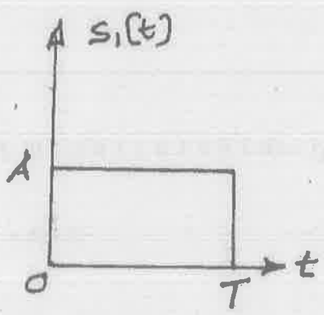
Answer **all** *questions.*

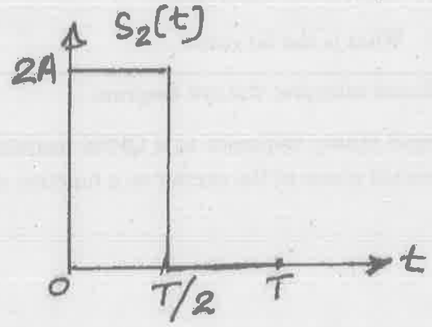
Each question carries 12 *marks.*

11. What is a Gaussian process ? Explain the properties of Gaussian process.

Or

12. Apply Gram Schmidt orthogonalisation to obtain ortho normal basis functions for the signals shown below. Express the signals in terms of ortho normal basis functions.





13. What is matched filter ? Show that its impulse response it time reversed and delayed version of input signal.

Or

14. Derive the expression for probability of error calculation in a maximum likelihood receiver.

15. Explain sampling procedure mathematically along with derivation of interpolation formula.

Or

16. Explain DM and ADM system and derive the SNRo of DM system.

17. Derive the ideal Nyquist's solution for zero ISI and write short note on raised cosine spectrum.

Or

18. What is correlative level coding ? Explain Duobinary coding with and without prep-coding.

19. Explain QPSK waveform generator and coherent QPSK receiver.

Or

20. Explain generation and detection of BPSK. What is decision rule and decision error ?

(5 × 12 = 60 marks)