G 1142 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch—Electronics and Communication Engineering

DIGITAL COMMUNICATION TECHNIQUES (L)

(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. Explain the characteristics of receiving filter.
2. What is ISI ? Explain in details. List the techniques to combat ISI.
3. What is the need and principle of an equalizer ? Explain.
4. Define and explain the parameters of Eye diagram.
5. Define and explain the significance of BER.
6. What is OOK modulation ? Explain its mathematical representation.
7. State and explain sampling theorem.
8. What is the principle and applications of ADM ? Explain.
9. Define and explain the types of noise.
10. A communication channel with additive white Gaussian noise, has a bandwidth of a 4 KHz and SNR of.

(10 × 4 = 40 marks)

Part B

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

11. State and prove the properties of Gaussian probability function.

Or

12. Explain the concept of Nyquist pulse shaping criteria with an example.
13. Explain the principle of Adaptive equalizer with a neat diagram. Explain its design details with an example.

Or

14. Explain the significance of eye pattern with neat diagrams and examples. Also explain how PRBS is generated, with a diagram.

Turn over

15. Compare and contrast different digital modulation formats. Derive probability of error for any two modulation formats.

Or

16. Explain the BPSK format with diagrams. Bring out its mathematical representations.

17. Explain A law and μ law in detail.

Or

18. Write technical notes on :

    (a) slope over loading ;

    (b) CVSD.

19. Define and explain noise temperature and noise figure. Derive the relation between them.

Or

20. State and prove all the properties of matched filter. Explain their characteristics.

(5 × 12 = 60 marks)

G 1152 (Pages : 2) Reg. No.....

Name.....

B.TECH DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Electronics and Communication Engineering/Information Technology/Applied Electronics and Instrumentation/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. What are the advantages and limitations of digital signal processing ?
2. Give direct-form I and direct-form II structure of second order system realization ?
3. Define Hanning and Blackman window functions.
4. List the characteristics of FIR filters designed using window functions.
5. Define Complex Conjugate of DFT property .
6. What is the relationship between Z transform and DFT ?
7. Express the fraction 7/8 and –7/8 in sign magnitude, 2's complement and l's complement ?
8. What are the three types of quantization error occurred in digital systems and explain any one ?
9. What are the advantages of digital recording ?
10. Explain about homomorphic vocoder ?

(10 × 4 = 40 marks)

Part B

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

11. Obtain the the direct form-I, direct form-II form realization for the given system :

$$y(n) = -0.1\, y(n-1) + 0.2\, y(n-2) + 3x(n) + 3.6\, x(n-1) + 0.6\, x(n-2).$$

12. Design a Chebyshev filter with a maximum pass band attenuation of 2.5 dB, at pass band frequency 20 rad/sec and the stop band attenuation of 30 dB at stop band frequency 50 rad/sec.

Turn over

13. Design an ideal Hilbert transformer having frequency response (May 2007)

$H\left(e^{j\omega}\right) = j$ for $-\pi \le \omega \le 0$

$= j$ for $0 \le \omega \le \pi$ using

(i) Rectangular window.

(ii) Black man window For N = 11 plot the frequency response in both cases.

Or

14. Explain in detail about linear phase filter.

15. Compute the 8 point DFT of the sequence $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ using DIT FFT.

Or

16. Compute an 8 point DFT using DIF FFT radix 2 algorithm $X(n) = \{1, 1, 1, 1, 1, 1, 1, 1\}$.

17. The coefficients for a system defined by $H(z) = 1/\left[\left(1 - 0.4z^{-1}\right)\left(1 - 0.55z^{-1}\right)\right]$ are represented in a number system with a sign bit and 3 data bits using signed magnitude representation and truncation. Determine the new pole locations for direct realization and for cascade realization of first order systems.

Or

18. Explain about fixed point and floating point representation.

19. Write a short note on :

(a) Subband coding.

(b) Speech coding.

Or

20. Explain in detail about speech analysis.

(5 × 12 = 60 marks)

G 1161 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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** *questions.*

Each question carries 4 *marks.*

1. What are HPBW and FNBW? Explain them.
2. Define Polarization. What is its significance? Explain the types.
3. What are the advantages and applications of pattern multiplication principle? Explain.
4. What are the different feed techniques for parabolic reflector? Explain any *two*.
5. Differentiate Travelling wave antenna from Standing Wave antenna.
6. Why GaAs is generally preferred semiconductor substrate materials for Patch antenna? Explain.
7. Define Surface waves. Enumerate the limitations of it.
8. Draw ionospheric profile and explain it in detail.
9. List the methods for measuring antenna input impedance. Explain any *one* in detail.
10. Why polar plot is preferred over linear plot in antenna pattern measurement? Explain.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 12 *marks.*

11. (a) Define and explain the parameters of an antenna.

    (b) Derive the radiation resistance of a Quarter wave monopole antenna. Explain the steps.

Or

12. (a) Derive the relation between antenna gain and effective area.

    (b) Derive FRIIS Transmission formula. Explain the applications of it.

Turn over

13. (a) Compute the 3dB beam widths of BSA and EFA. Compare and comment on them.

(b) Discuss the principle of binomial array in detail with neat diagrams.

Or

14. (a) Explain the development of folded dipole antenna from a 2-wire short-circuited transmission line, with neat diagrams. Derive its radiation resistance.

(b) Explain the principle of operation of parabolic reflector with a neat diagram.

15. (a) Explain the construction of 3-element Yagi Uda antenna, with a diagram. Explain the applications and limitations of it.

(b) Explain the types of loop antennas with neat diagrams.

Or

16. Explain the geometry and principle of operation of a rectangular microstrip antenna with a diagram. Explain the various feed techniques for a microstrip antenna.

17. (a) Differentiate Ground waves, space waves and sky waves.

(b) Explain the 2-ray model of Space wave propagation with a diagram. Derive an expression for its electric field strength.

Or

18. (a) Explain the characteristics of ionospheric waves. Also derive their characteristic equations.

(b) Write a technical note on "Fading and its types".

19. Draw a neat block diagram for antenna radiation pattern measurement. Explain the procedure in detail. Comment on the requirements for a true antenna measurement.

Or

20. (a) Explain the procedure for radiation resistance measurement with a block diagram.

(b) Write short notes on "Antenna outdoor measurements".

(5 × 12 = 60 marks)

G 1195 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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** *question.*
Each question carries 3 *marks.*

1. Consider the random process $x(t) = A \sin(w_0 t + \theta)$, where θ is uniformly distributed in the interval $[-\pi, \pi]$. Verify whether $x(t)$ is wide senses stationary [WSS].
2. With a neat block diagram, explain a digital communication system.
3. A binary PAM wave is required to be transmitted via a channel having bandwidth 75 kHz. The bit duration is 10 μsec. Find a raised cosine spectrum that satisfies these requirements.
4. Write a short note on eye pattern.
5. What is trellis coded modulation ?

(5 × 3 = 15 marks)

Part B

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

6. Give the steps for finding the basis functions using orthogonalization procedure for N = 2.
7. What are the properties of matched filter ?
8. What is the necessity for non-uniform quantization ? Explain μ-law and A-law companding.
9. Describe Nyquist's criteria for distortionless base band transmission and mention its practical limitation.
10. Explain and draw the signal constellation for M-ary QAM for M = 16.

(5 × 5 = 25 marks)

Turn over

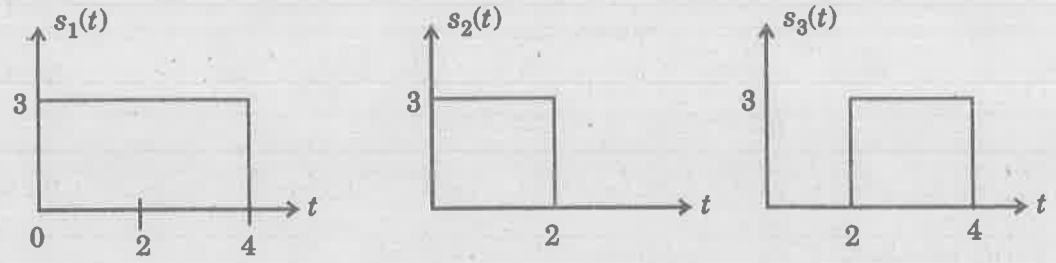
Part C

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

11. Prove that mean square error of reconstructed message process is zero for wide senses stationary message process whose power spectral density is strictly bandlimited.

Or

12. Apply Gram Schmidth orthogonalisation to obtain orthonormal basis functions for the signals shown. Express the signals in terms of orthonormal basis functions.



13. Explain matched filter receiver and derive the expression for signal to noise ratio for a matched filter receiver.

Or

14. Define MAP criteria in a receiver and explain how ML criterion is used in correlation receiver.

15. With diagrams, explain in detail the operation of a DPCM transmitter and receiver.

Or

16. Obtain an expression for Fourier transform of a sampled signal. Assume flat top sampling. State and prove sampling and reconstruction of low-pass signals using Nyquist criterion.

17. What is correlative coding ? Explain duobinary coding with and without precoding.

Or

18. Define Inter symbol interference and explain ideal solution for zero ISI.

19. Derive an expression for probability of error in binary FSK generation and coherent detection.

Or

20. (a) Calculate the bandwidth efficiency of M-ary signaling scheme. (6 marks)

    (b) Explain with neat block diagram, the coherent QPSK transmitter and receiver. For the given binary sequence of 01101000, draw the signal space representation and relevant QPSK wave forms.

(6 marks)

[5 × 12 = 60 marks]

G 1213 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 603—RADIATIONS 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 Antenna temperature.
2. What are called grating lobes ?
3. Write short notes on smart antennas.
4. What are the properties of binomial arrays ?
5. What is meant by space wave propagation ?

(5 × 3 = 15 marks)

Part B

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

6. Explain the structure of ionosphere.
7. Derive the relationship between Maximum Usable Frequency (MUF) and Critical Frequency (FC)
8. Explain briefly about phased arrays.
9. What is meant by duct propagation ?
10. Define (a) beam solid angle ; (b) antenna polarisation.

(5 × 5 = 25 marks)

Part C

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

11. Derive the power radiated and radiation resistance of current element.

Or

12. What is meant by antenna efficiency ? How it is related with radiation resistance and what are the different factors on which radiation resistance depends on ?

13. Explain the principle and design procedure for a Dolph-Chebyshev arrays.

Or

14. What is meant by an end fire array ? How will you design an EFA ? Derive the equation for directivity of an EFA.

15. Explain the principle and working of ground penetrating RADAR.

Or

16. Explain briefly about (a) Lag periodic antennas ; (b) Reflector antennas and their feed system.

17. Explain briefly about (a) Fading ; (b) Diversity reception.

Or

18. Explain briefly about ground wave and sky wave propagation. Calculate the field strength at a distance due to ground wave.

19. Explain the process of measurement of impedance efficiency.

Or

20. Explain the measurement procedure of directional pattern and polarisation.

(5 × 12 = 60 marks)

G 1224 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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. Define zero-address, one-address and 1½ address instructions.
2. Explain how floating point numbers are represented.
3. What is meant by locality of reference ?
4. Write a note on data dependences.
5. List the functions of SMPS.

(5 × 3 = 15 marks)

Part B

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

6. Briefly explain program controlled I/O.
7. Explain single bus, two bus and three bus structures.
8. Write a note on I/O channels.
9. Explain Flynn's classification of computers.
10. Write a note on Pentium processor.

(5 × 5 = 25 marks)

Part C

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

11. Explain various addressing modes.

Or

12. Write a note on pipelining. Explain multithreading.

Turn over

13. Explain hardwired and microprogrammed control.

Or

14. Explain restoring division and non-restoring division algorithms.

15. Explain various semiconductor RAM memories.

Or

16. Give the block diagram showing memory organization of a 4 M × 16 memory using 256 K × 1 memory chips.

17. Explain message passing architecture.

Or

18. Write notes on multicore processors, multiprocessor systems and multicomputer systems.

19. Explain the architecture of a PC, with block diagram.

Or

20. Explain the architecture and components of motherboard.

(5 × 12 = 60 marks)

G 1236 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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. Compare microcontrollers and microprocessors.
2. Explain PSW.
3. Which bits in which registers should be set to give the serial data interrupt highest priority.
4. Write an assembly language program for reading status of switch connect in P1.3.
5. Write an example each for data movement instruction add and subtract instructions of a PIC.

(5 × 3 = 15 marks)

Part B

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

6. Explain the functioning of a stack pointer.
7. Find the size of delay in following program, if the crystal frequency is 11.0592 MHz :—

			Machine cycle.
DELAY :	MOV	R3, # 250	1
HERE :	NOP		1
	NOP		1
	NOP		1
	NOP		1
	DJNZ	R3, HERE	2
	RET		2

Turn over

8. Explain the different modes of timer operation.

9. Briefly explain the intelligent LCD display of 2 lines with a neat sketch.

10. Mention the features of a PIC 18 microcontroller.

(5 × 5 = 25 marks)

Part C

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

11. Explain the architecture of 8051 with internal block schematic.

Or

12. Explain the I/O ports of 8051 with pin diagram and necessary circuits.

13. Write a program to copy the value 50 H into RAM memory locations 30H and 31H using (a) Direct addressing mode; (b) Register indirect addressing mode without a loop; (c) with a loop.

Or

14. Write an assembly language program for 8051 to find the smallest number from a group of 9 stored in the external memory starting from 4000h onwards.

15. Write a program for 8051 to transfer "ND" serially at 9600 band, 8-bit data, 1-stop bit. Do this continuously.

Or

16. Write an assembly language program to generate a square wave with 70 % duty cycle.

17. Explain DAC interfacing with 8051 with an application.

Or

18. With a neat diagram, explain how a 7-segment LED is interfaced with 8051. Write an assembly language program to display "5" using 7-segment display.

19. Explain the program and data memory organization in PIC 18 series.

Or

20. Explain about the instruction set of PIC 18 series with examples.

(5 × 12 = 60 marks)

G 1262 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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. What is the need of micro electrodes ?
2. If a person stands up, does his heart rate increase ? Why ?
3. How does an evoked EEG response differ from a conventional electro encephalogram ?
4. List the most important components of the blood.
5. Differentiate CT scanning and CAT scanning.

(5 × 3 = 15 marks)

Part B

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

6. What are resting and action potentials ? Give their characteristics and explain how they are propagated ?
7. Describe sphygmomanometer method of measuring blood pressure.
8. What is meant by 10 – 20 electrode placement system ? Sketch the EEG electrode placement with its name.
9. For what measurements can a spirometer be used ? What basic lung volumes and capacities cannot be measured with a spirometer ? Why ?
10. Explain the principle and applications in medicine, of magnetic resonance imaging ?

(5 × 5 = 25 marks)

Turn over

Part C

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

11. With neat diagrams, explain different types of biopotential transducers, with the help of examples.

Or

12. (a) Explain the functional organization of the peripheral nervous system. (8 marks)

(b) Explain the skin-electrode equivalent circuit. (4 marks)

13. With necessary diagram, explain Einthoven triangles properties and the 12 lead configuration of ECG analysis with their respective waveform.

Or

14. (a) With a circuit diagram, explain the working of an ECG amplifier ? (7 marks)

(b) Explain the indicator dilution method of blood flow determination. (5 marks)

15. Design a hospital with telemetry system, explaining why you would telemeterize the functions you have selected.

Or

16. (a) What are bed-side monitors ? Explain with examples. (8 marks)

(b) What is a cardiac tachometer ? Explain its applications ? (4 marks)

17. Explain the operation of electromagnetic and ultrasonic blood flow meters.

Or

18. With neat circuit diagrams, explain properties of the following and show how good circuits can be designed ?

(i) Isolation amplifiers.

(ii) Chopper stabilized amplifiers.

19. (a) Explain the principle of generation of X-rays. (6 marks)

(b) Describe the working principle of auto-collimators. (6 marks)

Or

20. Discuss the properties of ultrasound and how ultrasound can be used for diagonosis ? Explain ultrasound imaging and its applications.

(5 × 12 = 60 marks)

G 1264 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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 the need of pre-equalising and post-equalising pulses.
2. List the merits and demerits of PAL system compared to NTSC system.
3. Explain the functioning of cable decoders.
4. Explain the necessity of duplexer in a radar.
5. Give two reasons why a parabolic reflector is suitable for a radar antenna.

(5 × 3 = 15 marks)

Part B

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

6. Sketch and fully label the desired response of a TV receiver that includes necessary correction for the discrepancy caused by VSB transmission in the 625 PAL system. Comment on the features of the curve drawn by you.
7. What do you mean by compatibility in TV transmission ? Enumerate the essential requirements that must be met to make a colour TV (625 line PAL) system fully compatible ?
8. Explain digital representation of video signals.
9. Compare monopulse radar with conical scan radar.
10. What are the methods of Jamming enemy radar ?

(5 × 5 = 25 marks)

Turn over

Part C

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

11. Give a neat labelled sketch of three complete horizontal line durations, both active and blanked durations, assuming a white, grey and black line display. Explain the features and functions of various portions in it.

Or

12. With a neat BJT circuit diagram, explain the functioning of an ac coupled video amplifier. Explain the function of spot-killer switch in it.

13. With a neat block diagram, explain the working of a PAL coder and decoder. Compare its performance with SECAM and NTSC systems.

Or

14. Explain (i) Colour killer ; (ii) Pin-cushion correction ; and (iii) shadow mask delta gun picture tube.

(4 + 4 + 4 = 12 marks)

15. Describe the different types of cable distribution networks and the various frequency bands used in cable TV. Mention their relative merits and limitations. Discuss the special features of the fibre optic cable system.

Or

16. What are the requirements for digitization of video signal as regards to the quantization, bit rate etc. Compute the minimum bit rate for the 625/50 Hz PAL system. Discuss the methods of bit rate reduction.

17. List the advantages offered by non-coherent MTI-pulse doppler radar. With a neat block diagram, explain its working, discussing the applications.

Or

18. (a) Derive the basic radar range equation as governed by the minimum receivable echo power P_{min}.

(6 marks)

(b) Calculate the maximum range of a radar system having the peak power of 400 kW, PRF of 1500 pulses per second and a pulse width of 0.8 μS.

(6 marks)

19. (a) Explain the role of duplexers in radar, with diagrams explain the working of a balanced duplexer.

(b) Explain the A-scope and PPI displays and their features and merits.

Or

20. Explain the principle and applications of :

(i) Radomes. (6 marks)

(ii) Bistatic radar. (6 marks)

[5 × 12 = 60 marks]

G 1199 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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

1. Explain the key benefits of Digital Signal Processing.
2. Determine the systems described by the following equations are linear or non-linear
   (a) $y(n) = nx(n)$
   (b) $y(n) = x^2(n)$.
3. Explain two methods in IIR filter design for mapping of transfer function from s domain to z domain.
4. Determine the direct form II of the LTI system described by the difference equation
   $y(n) = ¼y(n-2) + x(n)$.
5. Let X (k) be N point DFT of a N-point sequence $x(n)$, show that $x^*(n) = X^*(N-k)$.

(5 × 3 = 15 marks)

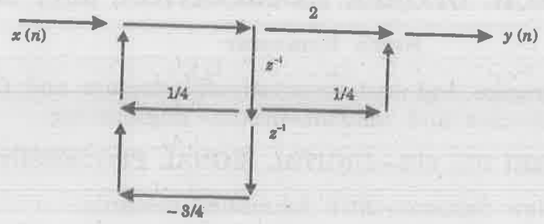
Part B

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

6. State the sampling theorem. Also write down the reconstruction formula. For the analog signal $x(t) = 3\cos 50\pi t + 10\sin 300\pi t - \cos 200\pi t$ find the minimum rate of sampling.

Turn over

7. Obtain the system function H (z) of the discrete system shown :



8. Compare IIR and FIR filters. State an application where FIR filters are preferred ?
9. Explain quantization and round off effects in digital filters.
10. Find the 4 point DFT of the sequence $x\,[n] = [2, 1, 2, 1]$.

(5 × 5 = 25 marks)

Part C

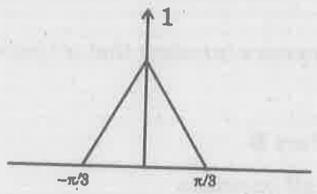
Answer **all** *questions.*
Each question carries 12 *marks.*

11. (a) State and prove Parseval's relation in the case of DTFT.

(b) Obtain DTFT of the sequence $y[n] = n\alpha^n u[n], |\alpha| < 1$.

Or

12. For a sequence $x\,[n]$ with spectrum shown below down sampled by a factor 3. Express the resultant sequence in terms of $x\,(n)$ and draw its spectrum.



13. The transfer function of a LTI system is given by $H(z) = \dfrac{1}{1 - \frac{11}{2} z^{-1} + \frac{17}{2} z^{-2} - 3z^{-3}}$.

Find the impulse response if the system is causal and stable.

Or

14. Explain four types of linear phase systems.

15. Obtain the direct form structure for the following linear phase filter with system function

$H(z) = 1 + 2.88\, z^{-1} + 3.4048 z^{-2} + 1.7\, z^{-3} + 0.4\, z^{-4}$.

Or

16. Design a digital Butterworth filter with the following specifications :

Pass band ripple : ≤ 0.5 dB.

Pass Band Edge / Stop Band Edge : 1. 2 kHz / 2 kHz.

Stop band Attenuation : ≥ 40 dB, Sample rate : 8 kHz.

17. Convert the analog filter with system function $H(s) = \dfrac{s + 0.1}{(s + 0.1)^2 + 9}$ into digital IIR filter by impulse invariance method.

Or

18. Design a FIR filter with Kaiser window to meet the following specifications :

$\left|H\left(e^{j\omega}\right)\right| \geq 1, \qquad 0 \leq w \leq 0.25\pi$

$\left|H\left(e^{j\omega}\right)\right| \leq 0.01, \qquad 0.35\,\pi \leq w \leq \pi.$

(a) Determine the minimum length M + 1 of the impulse response and the value of the Kaiser window parameter for the filter.

(b) Find the delay of the filter.

19. Explain the DIT-FFT algorithm. Find the DFT of the sequence $x\,(n) = \{0, 1, 2, 0, 1, 2, 3, 1\}$ using radix 2 FFT algorithm.

Or

20. Given the sequences $x_1\,(n) = \{1, 2, 1, 2\}$ and $x_2\,(n) = \{1, -1, 1, -1\}$. Compute :

(a) The circular convolution $x_1(n) \circledcirc x_2(n)$

(b) Linear convolution using DFT.

(5 × 12 = 60 marks)