G 5013 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electronics and Communication Engineering

EC 010 405—ANALOG COMMUNICATION (EC)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is the need for modulation ? Explain.
2. What is the principle of synchronous detection ?
3. What is TRF Receiver ? What is its principle ?
4. State Baye's theorem.
5. Define Noise. Write the types of Noise.

(5 × 3 = 15 marks)

Part B

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

6. What is VSB ? Explain its features and applications.
7. Compare and contrast SS13 SC and DSBSC.
8. Define high level and low level modulations.
9. What is conventional probability ?
10. Define shot noise. Write expressions for shot noise current and SNR.

(5 × 5 = 25 marks)

Part C

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

MODULE 1

11. Draw a neat block diagram of a communication system and explain its working in detail.

Or

12. Compare and contrast all the parameters of AM, FM and PM.

Turn over

MODULE 2

13. Explain the working principle of square law detector and Envelop detector with neat diagrams.

Or

14. Explain any *two* detection methods of SSB with neat diagrams.

MODULE 3

15. Draw a neat diagram of Foster-Sceley discriminator and explain its principle of operation.

Or

16. Draw a neat block diagram of super heterodyne receiver and explain its principle of working.

MODULE 4

17. State and prove all the properties of conditional PDF.

Or

18. A random variable X is known to be Gaussian with $a_x = 1.6$ and $\sigma_x = 0.4$. Find (a) $P\{1.4 < x \leq 2.0\}$ and ; (b) $p\{-0.6 < (x - 1.0) \leq 0.6\}$.

MODULE 5

19. Define and explain Noise Figure. Obtain the noise figures of a Cascaded stage.

Or

20. (i) Derive the relation between noise temperature and noise figure.

(ii) Explain the properties of AWGN.

(5 × 12 = 60 marks)

G 4990 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

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

AI 010 403/EC 010 403/EI 010 403—SIGNALS AND SYSTEMS (AI, EC, EI)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define continuous time signals and classify them.
2. State the conditions for the existence of fourier series.
3. List the properties of DTFT.
4. State sampling theorem. Give its expression.
5. What is the time shifting property of Z transform ?

(5 × 3 = 15 marks)

Part B

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

6. Determine whether the following systems are Static *or* Dynamic, Linear *or* Nonlinear, Shift variant *or* Invariant, Causal *or* Non-causal, Stable *or* unstable.

   (i) $y(t) = x(t + 10) + x^2(t)$

   (ii) $dy(t)/dt + 10y(t) = x(t)$.

7. Explain periodic signal contribution of Fourier transform.
8. State and prove the periodic time shift and periodic convolution properties of discrete time Fourier series (DTFS) ?
9. Explain the magnitude response of elliptic filter.
10. Give the relationship between Z transform and Fourier transform.

(5 × 5 = 25 marks)

Turn over

Part C

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

MODULE 1

11. Distinguish between the following :—

    (i) Continuous Time Signal and Discrete Time Signal ;

    (ii) Unit step and Unit Ramp functions ;

    (iii) Periodic an Aperiodic signals ;

    (iv) Deterministic and Random signals.

Or

12. Find out the given signal in periodic and If periodic find its period of $x(t) = \sin(2\pi t) + \sin(200\pi t)$?

MODULE 2

13. Find the Fourier transform given signal : (a) e^{at} ; (b) te^{-at}.

Or

14. Derive the mathematical expression for continuous time Fourier series.

MODULE 3

15. Explain and derive the discrete time Fourier series along with properties.

Or

16. Find the impulse response and step response :

    $Y(n) - 3/4\, y(n-1) + 1/8\, y(n-2) = x(n)$?

MODULE 4

17. Explain about frequency domain characteristics of ideal filters.

Or

18. Write short notes on : (a) Butterworth filter ; (b) Chebyshev filter.

MODULE 5

19. State and prove the properties of Z-transform.

Or

20. Find Z-transform of $x(n) = 2/3\, n\, u(n) + (-1/2)\, n\, u(n)$ and plot the ROC, Pole – zero of X (Z).

(5 × 12 = 60 marks)

G 4940 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

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

DIGITAL ELECTRONICS AND LOGIC DESIGN (LAS)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Prove the universality of NAND gate.
2. Define and explain (i) propagation delay, (ii) noise margin with respect to TTL family.
3. Implement $f(a, b, c) = \Sigma (1, 3, 4, 6, 7)$ using a single 3 to 8 decoder minimizing the number of inputs to be summed.
4. Prove that a 2-input MUX is a universal logic gate.
5. Write the function table for a half subtractor and implement it using minimum gates.
6. Implement a half-adder using basic gates and show the implementation of full-adder using half-adders.
7. Explain the gated RS Latch.
8. Derive the characteristic equation of JK flip-flop.
9. Distinguish between synchronous sequential circuit and asynchronous sequential circuit.
10. Differentiate between static and dynamic RAM ?

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) What is an exclusive OR gate ? Draw its symbol and prepare the truth table for a 3-input exclusive OR.

(8 marks)

Turn over

(b) A NOT gate has $V_{1L} = 0.7$ volt, $V_{1H} = 3$ volt, $V_{OL} = 0.3$ volt and $V_{OH} = 3.8$ volt. If two such gates are connected together, calculate the low and high noise margins. (4 marks)

Or

12. (a) Draw a TTL circuit with totempole output and explain its working. Why should it not be used for wired AND connection? (8 marks)

(b) Explain the differences between current sourcing and current sinking based on a TTL family. (4 marks)

MODULE 2

13. Reduce and find the minimal SOP form and draw the minimal circuit using only NOR gates :

(a) $Y = \Pi M\ (0, 1, 2, 3, 4, 6, 10, 11, 13)$ (6 marks)

(b) $f = \Sigma m\ (1, 2, 3, 6, 8, 12, 14, 15)$ (6 marks)

Or

14. Draw the truth table for a 10 line decimal 4 line BCD priority encoder. Draw the simplified encoder circuit.

MODULE 3

15. Write the function table for a full subtractor. Design and implement it using minimum number of gates.

Or

16. Implement a full adder circuit using 3:8 decoder and two OR gates. Draw the circuit.

MODULE 4

17. Draw the circuit of a T-flip-flop with negative edge triggering. Use minimum number of logic gates. Explain its truth table which includes the clock input also.

Or

18. What is master-slave J.K. flip-flop? Draw and explain its circuit diagram using NAND gates only.

MODULE 5

19. Using excitation table and K-maps, design a modulo-14 counter and explain with the help of timing diagram.

Or

20. Explain the principle of a PROM. The capacity of a 4K × 8 PROM is to be expanded to 16K × 8. Find the number of chips required and the number of address lines in the expanded memory. Draw the block circuit diagram.

[5 × 12 = 60 marks]

G 4978 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

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

RELIABILITY AND HUMANITIES (LAS)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*
Each question carries 20 *marks.*

1. (a) Describe the measures of reliability.

   (b) Explain the classification of failures.

   (c) Given a 'θ' of 5000 hours and a uniform failure rate, what is the reliability associated with a specified service period of 200 hours.

   (6 + 6 + 8 = 20 marks)

Or

2. (a) Write notes on : (i) Reliability ; (ii) MTBF ; (iii) Failure rate.

   (b) State and explain the possible causes of low reliability of modern engineering systems.

   (c) It is desired to have a reliability of at least 0.95 for a specified service period of 8000 hours on the assumption of a uniform failure rate. Determine the least value of 'θ' that will give this desired value of reliability.

   (6 + 6 + 8 = 20 marks)

3. (a) Explain the bath tub curve of failure.

   (b) An electronic system consists of 3 subassemblies A, B and C. The equipment has to operate for 1000 hours. The failure rates for the 3 subassemblies are 25, 30,15 failures/10^6 hours respectively. What is the probability of survival of this equipment ?

   (10 + 10 = 20 marks)

Or

4. (a) Explain the hazard models of failure analysis.

   (b) A 1000 hours life test is performed on 7 components. One component fails after 600 hours of operation. Compute the failure rate if ail other components survive the test.

   (10 + 10 = 20 marks)

Turn over

5. (a) What do you mean by manufacturing planning for quality? State the quality aspects of planning for manufacture.

   (b) Explain the basic concept of sequencing.

(12 + 8 = 20 marks)

Or

6. (a) What do you understand by quality standards ?

   (b) Explain the needs for prototype tests.

   (c) What do you mean by optimum reliability ?

(7 + 7 + 6 = 20 marks)

7.(a) Compare control charts for variable and control charts for attributes.

   (b) Explain process capability.

(12 + 8 = 20 marks)

Or

8. (a) What do you understand by "statistical control of production processes" ? Describe the method of constructing $\bar{X}$ and R charts and explain how these charts help in determining lack of control.

   (b) What do you mean by Re-engineering ?

(14 + 6 = 20 marks)

9. (a) Explain any *two* theories of motivation.

   (b) What are the elements of a good wage system ?

(12 + 8 = 20 marks)

Or

10. (a) Explain the different methods of handling worker's grievances in an industry.

    (b) Differentiate between a time wage system and a piece wage system. Mention the merits and demerits of each of the system.

(8 + 12 = 20 marks)

[5 × 20 = 100 marks]

G 4936 (Pages : 3) Reg. No. 4th sem ECE

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Engineering Mathematics—III (CMELRPTANSUF)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Answer **one** *full question from each module.*
Each full question carries 20 *marks.*
Use of statistical tables is permitted.

MODULE 1

1. (a) Solve $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = 0$, given that when $t = 0$, $y = 0$ and $\frac{dy}{dt} = 0$. (5 marks)

(b) $2(y + z)\,dx - (x + z)\,dy + (2y - x + z)\,dz = 0$. (5 marks)

(c) A particle of mass 4 gram vibrates through one centimeter on each side of the middle point of its making 330 complete vibrations per minute. Assuming its motion to be SHM, show that the maximum force upon the particle is $484\pi^2$ dyne. (10 marks)

Or

2. (a) Solve $(D^3 - 6D^2 + 11D - 6)\,y = e^{-2x} + e^{-3x}$. (6 marks)

(b) Solve $\frac{dx}{dt} + 5x - 2y = t$, $\frac{dy}{dt} + 2x + y = 0$; given that $x = y = 0$ when $t = 0$. (8 marks)

(c) Solve by the method of variation of parameters $y'' - 2y' + y = e^x \log x$. (6 marks)

MODULE 2

3. (a) Form partial differential equation by eliminating the arbitrary functions

$$z = f(x + ay) + g(x - ay).$$

(5 marks)

(b) Solve $pz - qz = z^2 + (x + y)^2$. (5 marks)

(c) A bar 10 cm. long, with insulated sides, having its ends A and B maintained at temperatures 50° C. and 100° C. respectively, until steady-state conditions prevail. The temperature at A is suddenly raised to 90° C. and at the same time that at B is lowered to 60° C. FInd the temperature distribution in the bar at time t. (10 marks)

Or

Turn over

4. (a) Solve by Charpit's method $(p^2 + q^2)\, y = qz$. (10 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + 2\frac{\partial^2 z}{\partial x\ \partial y} + \frac{\partial^2 z}{\partial y^2} = x^2 + xy + y^2$. (10 marks)

MODULE 3

5. (a) Find the Fourier sine and cosine transforms of $f(x) = \begin{cases} 1, & 0 \le x < a \\ 0, & x \ge a \end{cases}$. (12 marks)

(b) Solve the integral equation $\int_0^\infty f(x)\cos \lambda x\, dx = e^{-\lambda}$. (8 marks)

Or

6. (a) Express $f(x) = \begin{cases} 1, & 0 \le x < \pi \\ 0, & x \ge \pi \end{cases}$ as a Fourier sine integral and hence evaluate

$$\int_0^\infty \frac{1 - \cos \pi\lambda}{\lambda} \sin \lambda x\, d\lambda .$$

(10 marks)

(b) Find the Fourier Sine Transform of e^{-ax} and hence find the Fourier Sine Transform of $\frac{x}{x^2 + a^2}$.

(10 marks)

MODULE 4

7. (a) The following data are the number of seeds germinating out of 10 on damp filter for 80 sets of seeds. Fit a binomial distribution to this data :

x :	0	1	2	3	4	5	6	7	8	9	10	Total
f :	5	18	22	10	8	8	7	2	0	0	0	80

(10 marks)

(b) The incidence of occupational disease in an industry is such that the workmen have a 10% chance of suffering from it. What is the probability that in a group of 8, six or more will suffer from it ?

(10 marks)

Or

8. (a) It is known from the past experience that the number of telephone calls made daily in a certain community between 4 p.m. and 5 p.m. have a mean of 350 and a standard deviation of 30. What percentage of the time will there be more than 400 telephone calls made in this community between 4 p.m. and 5 p.m.?

(10 marks)

(b) The probability that a man aged 45 years will die before reaching the age of 50 years may be taken as 0.019. Out of a group of 500 men, now aged 45 years, what is the probability that 2 men will die within the next 5 years?

(10 marks)

MODULE 5

9. (a) Two random samples are drawn from two normal populations, gave the following results :

Sample 1 :	20	17	25	29	24	20	18	19
Sample 2 :	19	21	18	17	27	26	25	19

Test whether the two samples have the same variance at 5% of level of significance.

(10 marks)

(b) A set of 5 similar coins is tossed 320 times and the result is :

No. of heads :	0	1	2	3	4	5
Frequency :	5	28	75	115	68	31

Test the hypothesis that the data follow a Binomial distribution for V = 5; $\chi^2_{0.05} = 11.07$.

(10 marks)

Or

10. (a) If the mean of an infinite population is 550 with standard deviation 8.1, how large a sample must be used in order that there be one chance in 100 that the mean of the sample is less than 547?

(10 marks)

(b) The standard deviation calculated from two random samples of sizes 9 and 13 are 2.1 and 1.8 respectively. May the samples be regrated as drawn from normal populations with the same standard deviation?

(10 marks)

[5 × 20 = 100 marks]

G 4950 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

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

COMMUNICATION ENGINEERING—I (L A S)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. With simple mathematical expressions, explain the differences between frequency modulation and phase modulation.
2. A 1 MHz carrier is amplitude modulated by 500 Hz, 1020 Hz and 2.5 kHz audio waves. List the frequencies present in the output.
3. Distinguish between high level and low level modulated transmitters.
4. If a 10 kW amplitude modulated transmitter is modulated sinusoidally by 60 %, what is the total RF power delivered ?
5. Why is frequency modulation preferred for stereophonic broadcasting ?
6. Draw the circuit diagram of a practical diode detector used in AM broadcast receiver and label on it typical component values.
7. Explain how is frequency synchronisation achieved in SSB system ?
8. An AM broadcast station has a modulation index which is 0.70 on the average. What would be its average power saving if it could go for single sideband suppressed carrier transmissions, while having to maintain the same signal strength in its reception area ?
9. Distinguish between pulse and tone dialling ?
10. What are the causes of sidetone in a subscriber's telephone ? Why is the reduction of sidetone often considered desirable ?

(10 × 4 = 40 marks)

Turn over

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) From basics, derive an expression for the frequency modulated wave.

(b) A sinusoidal modulating wave of amplitude 6 V and frequency 1 kHz is applied to a frequency modulator. The frequency sensitivity of the modulator is 50 Hz/volt. The carrier frequency is 200 kHz. Calculate :

(i) Frequency deviation.

(ii) Modulation index.

Or

12. The peak-to-peak voltage of a sinusoidal carrier amplitude modulated by square wave is 3 Volt. The d.c. component is zero. The periodic time of the square wave is 0.5 ms. The carrier amplitude is 3.5 volt. Its frequency is 15 kHz. Arrive at equations for the modulating, the carrier and the modulated wave. Sketch these three waveforms.

MODULE 2

13. Draw and explain the circuit diagram of a high level modulated AM transmitter using BJT. With a block diagram describe the transmitter which uses the above circuit ?

Or

14. Explain Armstrong method of FM generator with suitable block diagram. What are its merits ?

MODULE 3

15. With neat circuit diagrams, indicate how AGC can be applied in transistor circuits ? What is delayed AGC ? How it is provided ?

Or

16. With a neat circuit diagram, explain two-stage IF amplifier. What are the major factors influencing the choice of IF in any particular system ?

MODULE 4

17. Draw the block diagram of a phase cancellation SSB generator and explain how the carrier and unwanted side band are suppressed ?

Or

18. With the help of necessary frequency spectrums, derive the time domain expression of a VSB modulated wave containing a vestige of the lower side band. Give the block diagram of the VSB generator and explain.

MODULE 5

19. With the help of diagrams, explain how the following subscriber telephone conditions are signalled in an automatic telephone exchange :

(a) Call subscriber originates a call.

(b) Calling subscriber dials.

(c) Called subscriber answers.

(d) Calling subscriber clears.

Or

20. Explain the principle of Facsimile with necessary diagrams. Describe the block schematics of the transmitter and receiver.

(5 × 12 = 60 marks)

G 4960 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

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

ELECTRONIC CIRCUITS—II (LAS)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define as an equation and also in words the following parameters :

   (a) h_{ic}; (b) h_{fc}; (c) h_{rc}; (d) h_{oc}.

2. If two identical stages, each having 30 Hz lower cut-off frequency are cascaded, find the overall lower cut-off frequency of the combination.
3. List the four properties of emitter follower.
4. The distortion in an amplifier is found to be 5%. The feedback ratio of a negative feedback amplifier is 0.05. When the feedback is removed, the distortion becomes 10%. Calculate the open loop gain and the closed loop gain.
5. In an RC phase shift oscillator, $R_1 = R_2 = R_3 = 100\ k\Omega$, $C_1 = C_2 = C_3 = 100\ pF$. The value of $R_c = 2\ k\Omega$. Calculate the frequency of oscillation.
6. Distinguish between LC and RC oscillators.
7. Determine the values of the capacitors to be used in an astable multivibrator to provide a train of pulses $1\ \mu S$ wide at a repetition rate of 50 kHz. Given $R_{B_1} = R_{B_2} = 100\ K, R_{C_1} = R_{C_2} = 4.7\ K$. $\beta_1 = \beta_2 = 150$.
8. Distinguish between base and collector triggering methods used in a monostable multivibrator.
9. How does the collector efficiency play an important role in power amplifiers ?
10. Distinguish between Miller and Bootstrap sweep generators.

(10 × 4 = 40 marks)

Turn over

Part B

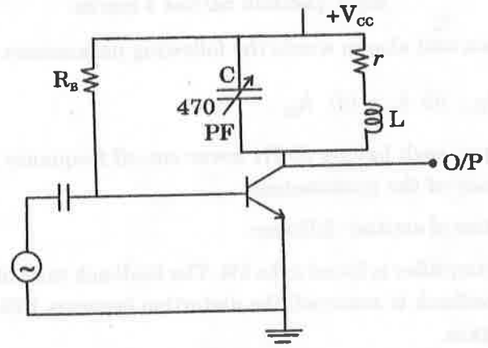
Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. Discuss the effects of cascading of amplifiers on the bandwidth and gain, with appropriate equations. Derive the equations for the two-stage cascaded amplifier.

Or

12. In the simple BJT tuned amplifier of figure shown below, the bandwidth is 4 kHz and the voltage gain has a maximum value at 200 kHz, when the tuning capacitor is adjusted to 470 pF.
    (a) Calculate coil inductance, given the coil Q as 75.
    (b) Find the circuit output impedance at resonant frequency.
    (c) When the amplifier is loaded the bandwidth increases by 1 kHz. Determine the value of load resistance.



Module 2

13. In a negative, feedback amplifier, A = 100, $\beta = 0.04$, $V_i = 40$ mV. Calculate (a) gain with feedback ; (b) output voltage ; (c) feedback factor ; and (d) feedback voltage. Derive the formula used.

Or

14. Draw the circuit diagram of a cascode amplifier using BJT and explain how it can provide (a) high output resistance ; (b) high bandwidth. Derive expressions for the same.

Module 3

15. Describe Colpitts oscillator circuit. The resonant circuit of a tuned collector transistor oscillator has a resonant frequency of 4 MHz. If the value of the capacitance is increased by 50%, calculate the new resonant frequency.

Or

16. (a) Describe the working of an RC-phase oscillator assembled using FET and compare with the BJT circuit.

(8 marks)

(b) In an RC-phase shift oscillator, the frequency of oscillation is 850 Hz, and $R_1 = R_2 = R_3 = 560\ k\Omega$, find the value of the capacitors.

(4 marks)

Module 4

17. A collector coupled astable multivibrator is to be used to produce an unsymmetrical square wave of durations $\tau_A = 310\ \mu sec$ and $\tau_B = 250\ \mu sec$, $V_{cc} = 15V$, $I_{csat} = 5mA$, $h_{fe} = 150$. Draw the circuit, find the component values and the time constants of the output waveform.

Or

18. Sketch an emitter coupled Schmitt trigger-circuit using NPN transistor and explain its operation, with the help of waveforms. Explain UTP, LTP and hysteresis of the circuit.

Module 5

19. A power transistor working as class A amplifier with transformer coupling to deliver a maximum of 5 W to 4 Ω load resistance. The Q-point is adjusted for symmetrical swing, $V_{CE} = 20$ V. Calculate :
    (a) Transform turns ratio N_2/N_1.
    (b) Peak collector current.
    (c) Q-point values for I_c.

Or

20. Explain the principle of linear sweep generation by a Bootstrap sweep circuit, with the help of the fictitious amplifier. Draw the circuit of the Bootstrap sweep generator and show how constant current charging is effected in it.

(5 × 12 = 60 marks)

(b) Find the autocorrelation of the following signals (i) $x_1(n) = \underset{\downarrow}{(4}, 3, 2, 1)$ (ii) $x_2(n) = u(n)$.

(6 marks)

Or

20. (a) Obtain the cross correlation of the following signals $x_1(t) = \sin(4\pi t)$ and $x_2(t) = \cos(4\pi t)$.

(4 marks)

(b) By direct computational method, obtain the cross correlation of the following sequences

$x_1(n) = [\underset{\uparrow}{2}, 3, 4]$ and $x_2(n) = [1, \underset{\uparrow}{2}, 3]$.

(8 marks)

[5 × 12 = 60 marks]

G 4970

(Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

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

SIGNALS AND SYSTEMS (L A S T)

(Old Scheme—Supplementary/Mercy Chance)

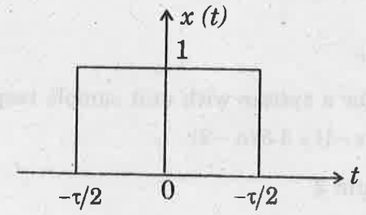
Time : Three Hours Maximum : 100 Marks

Missing data, if any may be suitably assumed.

Part A

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

1. How do you define time invariance property of a continuous time system ? Explain with an example.
2. A system is described by the input-output characteristics $y[n] = x[-n]$. Check if its is (i) stabe ; (ii) Causal.
3. Find the Fourier transform of the gate function shown below :



4. State and explain any two properties of CTFT ?
5. Find the discrete Fourier series representation of a periodic sequence $x(n) = \{1, 1, 0, 0\}$ with period N = 4.
6. Find the frequency response of the LTI system $h(t) = -\delta(t+1) + \delta(t) - \delta(t-1)$.
7. Find the system function, H (z) and unit-sample response $h(n)$ of the system whose difference equation is $y(n) = -\frac{1}{2} y(n-1) + 2x(n)$.

8. Determine the impulse response of $H(s) = \dfrac{2s-1}{s^2+3s+2}$.

9. Determine the energy spectral density and hence energy contents of the signal $x(t) = \sin c(t)$.

10. Find autocorrelation function and power spectral density of signal $x(t) = 10 \sin(w, t+\tau)$ where $w_1 = \dfrac{2\pi}{T}$.

(10 × 4 = 40 marks)

Part B

Answer any one **full** *question from each module.*
Each full question carries 12 *marks.*

Module 1

11. Find the natural and total response of the system described by the differential equation :

$$\frac{d^2y(t)}{dt^2} + 6\frac{dy(t)}{dt} + 8y(t) = \frac{dx(t)}{dt} + 2x(t).$$

where $x(t) = e^{-t}\,u(t)$ and $y(0^+) = 2, \dfrac{d}{dt}y(0^+) = 3$.

Or

12. Find the output $y(n)$ for $n = 1, 2, \ldots .6$ for a system with unit sample response $h(n) = 2^{-n}\,u(n)$ and whose input is $x(n) = 2\delta(n) + 4\delta(n-1) + 4\delta(n-2)$.

Module 2

13. (a) Find the Fourier series coefficients of the periodic signal $x(t) = \begin{cases} 1, & |t| < T_1 \\ 0, & T_1 < |t| < \dfrac{T}{2} \end{cases}$ (6 marks)

(b) Find the energy spectral density of the signal $x(t) = \begin{cases} e^{-2t}, & t \geq 0 \\ 0, & t < 0 \end{cases}$ (6 marks)

Or

14. Derive Parseval's theorem. Using the same find the energy of the signal $x(t) = e^{-at}\,u(t)$ and also energy in the frequency band $|w| \leq 0.5$ rad /sec.

Module 3

15. (a) Consider a system described by the differential equation $y(n) - 0.6\,y(n-1) = x(n) = (0.4)^n$, $n \geq 0$, $y(-1) = 10$. Find the solution using prescribed initial conditions.

(6 marks)

(b) Find the discrete time Fourier coefficients for

$$x(n)\,1 + \cos\left(\frac{2\pi}{N}\right)n + 2\cos\left(\frac{4\pi n}{N} + \frac{\pi}{3}\right) + 4\cos\left(\frac{6\pi n}{N} + \frac{\pi}{4}\right).$$

(6 marks)

Or

16. (a) Find the natural response for $y(n) + 0.1\,y(n-1) - 0.3\;\; y(n-2) = 2u(n)$, given $y(-1) = 0, y(-2) = 0$.

(6 marks)

(b) Find the inverse DTFT of the system $X\left(e^{j\Omega}\right) = \dfrac{\left(\frac{2}{3}\right)e^{-j\Omega} + 5}{1 + \left(\frac{5}{6}\right)e^{-j\Omega} + \left(\frac{1}{6}\right)e^{-2j\Omega}}$. (6 marks)

Module 4

17. Find the inverse z-transform of $X(z) = \dfrac{1}{1 - 1.5\,z^{-1} + 0.5\,z^{-2}}$ using power series expansion method for $|z| > 1$ and $|z| < 1$.

Or

18. A continuous time LTI system is initially relaxed and is represented by the equation $y''(t) + 3y'(t) + 2y(t) = 2x(t)$. Using Laplace Transforms,

(a) Determine transfer function of the system. (3 marks)

(b) Determine impulse response of the system. (4 marks)

(c) Find response of the system to an input $x(t) = 4e^{-3t}\,u(t)$. (5 marks)

Module 5

19. (a) Define PSD. Find the PSD for $x(t) = A\cos(2\pi f_c t)$ and hence find the average power of the signal $x(t)$.

(6 marks)

20. (i) Fit a normal curve and test the goodness of fit for :

x :	0	1	2	3	4	5	6	7	8
f :	2	4	10	15	19	12	8	7	1

(6 marks)

(ii) Test if the means are significantly different :

	Size	*Mean*	S.D.
Sample 1 :	5	11.4	2.65
Sample 2 :	7	14.4	4.37

(6 marks)

[5 × 12 = 60 marks]

G 4984

(Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(Regular/Improvement/Supplementary—New Scheme)

[Common for all Branches]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Find a_0 from $f(x) = \begin{cases} -\pi, & \text{if } -\pi < x < 0 \\ x, & \text{if } 0 < x < \pi. \end{cases}$

2. Find the Fourier cosine transform of $f(x) = \begin{cases} 1, & 0 < x < 1 \\ 0, & x \geq 1. \end{cases}$

3. Solve $zp = -x$.

4. Find E (x) from

x :	0	1	2	3
$p(x)$:	·1	·2	·4	·3

5. What do you mean by Hypothesis ? Write its types.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Obtain Fourier expansion for $\sin \alpha x$ in the interval $-l < x < l$.

7. Find the Fourier cosine transform of $x e^{-ax}$.

8. Form a partial differential equation by eliminating the arbitrary function ϕ from $\phi\left(x + y + z, x^2 + y^2 - z^2\right) = 0$.

9. Derive the mean of binomial distribution.

10. Write the working rule for testing the hypothesis ?

(5 × 5 = 25 marks)

Turn over

Part C

Each full question carries 12 marks.

11. (i) If $f(x) = \sqrt{1-\cos x}$, $0 \le x \le 2\pi$. Obtain the Fourier expansion and hence deduce that

$$\sum_{n=1}^{\infty} \frac{1}{4n^2-1} = \frac{1}{2}.$$

(8 marks)

(ii) Prove that for values of x in the range $(-\pi, \pi)$

$$\frac{1}{2}x = \sin x - \frac{\sin 2x}{2} + \frac{\sin 3x}{3} - \ldots.$$

(4 marks)

Or

12. (i) Obtain the Fourier series expansion for $f(x) = \begin{cases} x + \pi/2, & -\pi < x \le 0 \\ \pi/2 - x, & 0 \le x < \pi. \end{cases}$ (6 marks)

(ii) Prove that in the interval $-\pi < x < \pi$, $x \cos x = -\frac{1}{2}\sin x + 2\sum_{n=2}^{\infty} \frac{n(-1)^n}{n^2-1} \sin nx$.

(6 marks)

13. Find the Fourier transform of $f(x) = \begin{cases} a - |x|, & |x| \le a \\ 0, & |x| > a > 0. \end{cases}$ (12 marks)

Or

14. (i) Evaluate $\int_0^{\infty} \frac{dx}{(x^2+a^2)^2}$ using Parseval's identity. (6 marks)

(ii) Find the Fourier Cosine transform of $f(x) = e^{-ax}, a > 0$. (6 marks)

15. (i) Solve : $(D^2 - 2DD' + D'^2)z = \tan(y+x)$. (6 marks)

(ii) Solve : $(D^2 - 2aDD' + a^2 D'^2)z = f(y+ax)$. (6 marks)

Or

16. (i) Solve : $(D^2 - D')z = xe^{ax} + a^2 y$. (6 marks)

(ii) Solve : $(D - 3D' - 2)^2 z = 2e^{2x} \tan(y+3x)$. (6 marks)

17. Find the variance of : $f(x) = \begin{cases} \frac{1}{16}(x+3)^2, & -3 \le x < -1 \\ \frac{1}{16}(6-2x^2), & -1 \le x < 1 \\ \frac{(3-x)^2}{16}, & 1 \le x \le 3. \end{cases}$ (12 marks)

Or

18. (i) Fit a normal distribution for :

x :	1	3	5	7	9
f :	1	2	3	2	1

(6 marks)

(ii) There are 2 urns containing 4 white 6 Red and 15 black balls and 10 white 8 red and 12 black balls respectively. One ball is taken out from each urn. What is the probability that both are red ?

(6 marks)

19. (i) Test if the means are significantly different for

	n	*mean*	*S.D*
gp 1 :	50	181.5	3.0
gp 2 :	75	179	3.6

(6 marks)

(ii) Comment on the following :

Mathematical ability		*General ability* *Good*	*Fair*	*Poor*
GOOD	:	44	22	5
Fair	:	265	257	178
Poor	:	41	91	98

(6 marks)

Or

22. In December of this year the corporate planning commitee of a company was trying to develop a demand forecast for its best selling. During the current year the company forecast the monthly demand as follows :

Month	*Demand* (in number of units)
Jan ...	185
Feb ...	185
Mar ...	190
Apr ...	195
May ...	270
Jun ...	210
Jul ...	245
Aug ...	200
Sep ...	130
Oct ...	120
Nov ...	145
Dec ...	185

The initial forecast for January was 170. Forecast the demand for the next January.

(i) Simple average.

(ii) Six month weighted moving average using weights of 0.3, 0. 2, 0.2, 0,1. 0.1, 0.1 respectively (0.3 weight to the most recent month)

(iii) Single exponential smoothing with a smoothing parameter of 0.80.

(b) Silly Sally and Crazy Jane own a clothing store called "The Silly Sally and Crazy Jane clothing store". One day Silly Sally and Crazy Jane were commenting on how fast a new shirt has been selling. "It is really Crazy" said Silly Sally. "Yeah, it is really silly" said Crazy Jane. Silly Sally and Crazy Jane need a demand forecast for July based on sales for the first six months of the current year as shown in the following chart. Prepare a demand forecast for July using linear regression analysis.

Month	*Actual Demand*
Jan ...	435
Feb ...	420
Mar ...	485
Apr ...	510
May ...	465
Jun ...	450

(6 + 6 = 12 marks)

[5 × 12 = 60 marks]

G 4985 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Common to : AI, AU, EC, EI, IC, IT, ME, PO AND PE Branches

EN 010 402—PRINCIPLES OF MANAGEMENT

(New Scheme Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define Organizational structure.
2. Define Personnel Management.
3. State the objectives of production management.
4. What are the elements of cost ?
5. What are the duties of Sales Engineer ?

(5 × 3 = 15 marks)

Part B

Answer any **five** *questions.*
Each question carries 5 *marks.*

6. What are the various functions of Management ?
7. Discuss the selection procedure of manpower.
8. Explain the basic concepts of CPM and PERT.
9. Explain briefly the various types of capital.
10. Explain various Marketing management technique and its functions.
11. Explain line and staff organization structure used in industries.
12. What is meant by product life cycle ? Explain.

(5 × 5 = 25 marks)

Part C

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

13. What are the functions of management ? Explain in detail. (12 marks)

Or

14. Define and describe the nature and goals of management. What are the functions of a manager in your opinion ? Explain.

(12 marks)

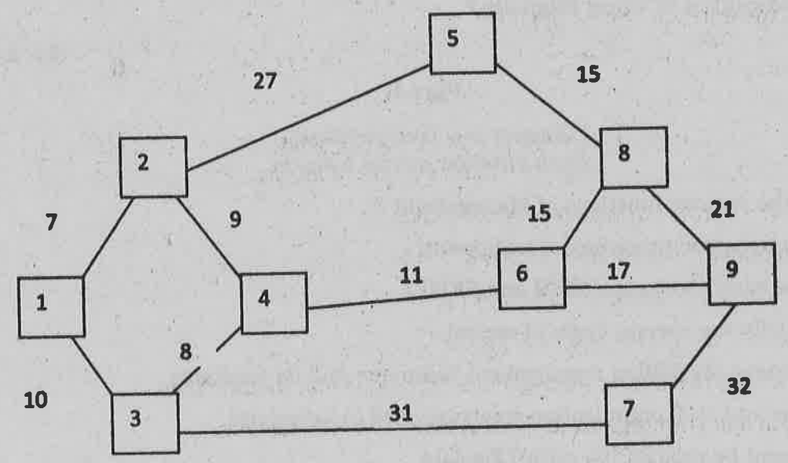
15. Discuss the main objectives and functions of personal management. (12 marks)

Or

16. What is meant by industrial dispute ? Explain in detail about the various method of settling the industrial disputes.

(12 marks)

17. Find the shortest path from Node 1 to Node 9 of the distance network shown in following figure using Dijkstra's algorithm.



Distance network

(12 marks)

Or

18. The following tables gives the activities in a construction project and other relevant information :

Activity i – j		*Normal time* (days)	*Crash time* (days)	*Normal Time* (days	*Crash cost* (Rs.)
1 – 2	o	20	17	600	... 720
1 – 3	r	25	25	200	... 200
2 – 3	k	10	8	300	... 440
2 – 4	o	12	6	400	... 700
3 – 4	f	5	2	300	... 420
4 – 5	t	10	5	300	... 600
4 – 6	h	5	3	600	... 900
5 – 7	e	10	5	500	... 800
6 – 7	p	8	3	400	... 700

(i) Draw the activity network of the project.

(ii) Using the above information crash the activity step-by-step until all paths are critical.

(12 marks)

19. What are the different types of capital available in financial management ? Explain factors affecting working capital in detail.

(12 marks)

Or

20. Explain with suitable example, how a selling price of product is arrived for a product.

(12 marks)

21. What are the functions of sales department ? Explain in detail. (12 marks)

Or

G 4999 **(Pages : 3)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : AI/EC/EI/IC

AI 010 404/EC 010 404/EI 010 404/IC 010 404—DIGITAL ELECTRONICS (AI, EC, EI, IC)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Explain how subtraction can be achieved using 2's complement arithmetic. How do you find whether an over flow has occurred or not ?
2. Draw the circuit diagram of 2 input NAND gate realized using transistor-transistor Technology (TTL) with totem pole output.
3. Write the truth tables of half adder and full adder.
4. Draw the circuit diagram of mod 16 synchronous up counter.
5. With an example, explain what is meant static 0 hazard, How is it prevented ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Fill up the following :
   (a) $(75.48)_{10} = (\_\_\_\_)_2$?
   (b) $(FB.C)_{16} = (\_\_\_\_)_2$,
   (c) $(0101101)_2 = (\_\_\_\_)_{gray}$,
   (d) $(111.1 \times 110)_2 = (\_\_\_\_)_2$,
   (e) $(44.45)_{10} = (\_\_\_\_)_8$.
7. Discuss the relative merits of ECL technology and TTL.
8. Implement the logic function $XY + \bar{X}\bar{Y} + YZ$ using a 4 to 1 multiplexer.
9. Explain the principle of operation of shift register. Explain any two applications of shift registers.
10. Explain Hazard free combinational circuits.

(5 × 5 = 25 marks)

Turn over

Part C

Each full question carries 12 marks.

11. (a) With an example, explain error detection codes and error correction codes. (6 marks)

(b) Simplify using K map,

$\Sigma(2, 4, 5, 6, 7, 11, 13) + \Sigma_d(0, 8, 10, 12)$. (6 marks)

Or

12. Draw the circuit diagram of 2 input NAND gate realized using TTL. What is the functions of the diodes at the inputs and at the totem pole outputs ? (12 marks)

13. (a) Simplify using K map $\pi(1, 3, 6, 5, 6, 9, 11, 12, 13) + \pi_d(4, 10, 14)$. (6 marks)

(b) Explain about gray code. (6 marks)

Or

14. (a) Explain the following in brief : Noise margin. (6 marks)

(b) Draw the circuit diagram of an CMOS inverter, CMOS NAND, CMOS NOR. (6 marks)

15. (a) Draw the circuit diagrams of SR Latch and JK Flip Flop, write their truth tables. (6 marks)

(b) Implement the logic function $y = \bar{P} \cdot \bar{Q} \cdot \bar{R} + P\bar{Q}R + PQ\bar{R}$ using multiplexer. (6 marks)

Or

16. (a) Explain the two methods by which a 4 to 1 multiplexer can be realized using 2 to 1 multiplexers. (6 marks)

(b) Draw the circuit diagram of a 8 bit magnitude comparator using 4 bit magnitude comparators. (6 marks)

17. (a) Draw the circuit diagram of a dynamic RAM and explain its operation. (6 marks)

(b) What is meant by fundamental mode of Asynchronous circuits. (6 marks)

Or

18. (a) What is the use of the following input/o/p's of a synchronous counter :

(i) RCO.

(ii) CTEN.

(iii) CLR.

(iv) LOAD. (8 marks)

(b) Explain the relative merits and demerits of Asynchronous and synchronous counter. (4 marks)

19. Draw and explain the architecture of a FPGA. (12 marks)

Or

20. Explain about programmable Logic Array. (12 marks)

[5 × 12 = 60 marks]