F 9365 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

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

RELIABILITY AND HUMANITIES (LAS)

(2002 Admissions onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

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

1. (a) Define reliability and explain its importance.
   (b) State and explain the factors to be considered in designing for reliability.
   (c) A particular component has a uniform failure rate of 0.00001 per hour. Find its reliability for a specified period of service of 10,000 hours and 2,000 hours.

(6 + 6 + 8 = 20 marks)

Or

2. (a) What are the measures of reliability ?
   (b) Write short notes on MTBF and MTTF.
   (c) It is desired to have a reliability of at least 0.990 for a specified service period of 8000 hours on the assumption of a uniform failure rate. What is the least value of 'θ' that will give this desired value of reliability ?

(6 + 6 + 8 = 20 marks)

3. (a) Calculate the probability of survival of a piece of equipment that is to operate for 600 hours and which consists of four subsystems A, B, C, D having the following MTBF's. MTBF for subsystem A = 5000 hours, B = 3000 hours, C = 15000 hours and D = 15000 hours.
   (b) Explain the failure rate curve of a complete product.

(10 + 10 = 20 marks)

Or

4. (a) A 750 hours life test is performed on six components. One component fails after 350 hours of operation. All others survive the test. Compute the failure rate.
   (b) Explain the constant hazard models and Weibull model with regards to failure analysis.

(8 + 12 = 20 marks)

5. (a) Explain the relationship between quality and reliability.
   (b) Explain the different quality costs.

(10 + 10 = 20 marks)

Or

Turn over

6. (a) Define the term quality and state the various factors which affect the product quality.

   (b) Explain the basic concept of sequencing.

   (c) Write notes on prototype tests.

(8 + 6 + 6 = 20 marks)

7. (a) State the objectives of $\bar{X}$ and R charts.

   (b) What is re-engineering ?

(12 + 8 = 20 marks)

Or

8. (a) What are the uses of control charts ?

   (b) A manufacturer purchases small blots in cartoons that usually contain several thousand bolts. Each shipment consists of a number of cartons. As a part of the acceptance procedure for these bolts. 400 bolts are selected at random from each carton and are subjected to visual inspection for certain defects. In a shipment of 10 cartons the respective percentages of defectives in the samples from each carton are 0, 0, 0.5, 0.75, 0, 2.0, 0.25, 0, 0.25 and 1.25. Does this shipment of bolts appear to exhibit statistical control with respect to the quality characteristics examined in the inspection ?

(8 + 12 = 20 marks)

9. (a) Explain Maslow's hierarchy of human needs.

   (b) What are the major causes of disputes in industries ?

(12 + 8 = 20 marks)

Or

10. (a) What do you mean by participative management ?

    (b) Differentiate between wages and incentives.

    (c) Explain industrial fatigue and discuss the methods to overcome it.

(6 + 6 + 8 = 20 marks)

[5 × 20 = 100 marks]

F 9347 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Electronics and Communication/ Applied Electronics and Instrumentation/ Electronics and Instrumentation Engineering

ELECTRONIC CIRCUITS—II (LAS)

(2002 Admission onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define the four hybrid parameters of CB configuration, giving their typical values.
2. What is base spreading resistance ? What is it significant at high frequencies ?
3. Compare the characteristics of voltage and current series negative feedback amplifiers.
4. Draw the circuit of a Darlington amplifier and derive the expression for its current gain.
5. Calculate the frequency of oscillation in a Colpitts oscillator which uses L = 0.01 mH, C_1 = 22pF, C_2 = 10pF.
6. Which type of oscillators are to be used when high stability in the frequency is required ? Justify your answer.
7. Clearly explain the role speed up capacitor in a Bistable multivibrator.
8. State and explain any two distinct applications of a bistable multivibrator.
9. What is cross-over distortion ? Where does it occur ? How it can be eliminated ?
10. Draw the circuit of a class C amplifier and sketch the output waveform corresponding to a sinusoidal input.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. Draw the high frequency hybrid π equivalent circuit for a CE transistor. Derive expression for the hybrid π parameters in terms of the low frequency h parameters.

Or

12. Deduce the $h\pi$ equivalent circuit of a CE amplifier and derive expression for its current gain as a function of frequency. Also define f_β and f_T plot the same on the graph.

Turn over

Module 2

13. Explain negative feedback in amplifiers. Draw the block schematics of four types of feedback and give expression for their A_f, R_{if} and R_{of}. Comment on the A_f of each type.

Or

14. (a) What is a cascode amplifier ? Explain its properties and applications.

(b) With a neat circuit diagram, explain the working of a difference amplifier ?

Module 3

15. With neat circuit diagrams using BJT, explain the principles of Wienbridge and Colpitts oscillator ? State the differences between the two.

Or

16. Deduce the equivalent circuit of a RC phase shift oscillator and derive expressions for its frequency and condition for oscillation.

Module 4

17. Draw and explain the circuits of transistorised monostable and bistable multivibrator with necessary waveforms. Compare and contrast the two circuits.

Or

18. (a) Explain with necessary diagrams, base and collector triggering methods. Bring out the differences between them. (8 marks)

(b) Explain different applications ofSchmitt trigger. (4 marks)

Module 5

19. With neat circuit and waveforms describe the working of a Miller sweep generator. Derive an expression for the slope error e_{ss} associated with the circuit.

Or

20. A transformer coupled class A power amplifier drives an $8-\Omega$ speaker through a 3 : 1 transformer. Using a power supply of 10 volt, the circuit delivers 0.48 watt to the speaker. Calculate the a.c. power developed across the transformer primary, r.m.s. value of load voltage, primary voltage, load current and primary current. Given that $I_{CQ} = 4$ mA. Assume the transformer is ideal.

[5 × 12 = 60 marks]

F 9327 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

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

DIGITAL ELECTRONICS AND LOGIC DESIGN (LAS)

(2002 Admissions onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Design and draw the circuit diagram for EX-OR gate (i) using only NOR gates (ii) using only NAND gates.
2. Draw the input and output characteristics of TTL gate and explain in brief.
3. What is Boolean Algebra ? Why does it to be simplified ? What are the methods ?
4. With the help of block diagrams, clearly distinguish between encoder and decoder.
5. Explain half adder and full adder with their truth tables.
6. Configure IC 7483 as adder as well as subtractor and explain in brief.
7. Explain the merits and demerits of Mastor-Slav JK flip-flops.
8. Explain the T-flip flop with logic diagram and truth table. What is its application ?
9. Compare and contrast static and dynamic RAM.
10. Explain PISO operation using shift register IC 7495.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) What is meant by active pull up and pull down in a TTL circuit ? Explain the performance improvements provided by them.

    (b) Design a logic gate circuit using fundamental logic gates, that compares two 4-bit numbers A and B, to check if they are equal. The circuit has one output X, so that X = 1 if A = B and X = 0 if A $\neq$ B.

Or

12. Explain the CMOS characteristics. Draw the internal circuit diagram of CMOS NAND gate and explain its working.

Turn over

Module 2

13. Using Quine McCluskey method, obtain the set of prime implicants for the function $f = \sum(4, 12, 13, 14, 16, 19, 22, 24, 25, 26, 29, 30) + \sum\phi(1, 3, 5, 20, 27)$ and hence obtain the minimal function and draw the circuit.

Or

14. With the help of K-maps, design 4 to 2 line priority encoder with a valid output where the highest priority is given to the highest bit position.

Module 3

15. Explain the working of a full subtractor with its function diagram. Show how a full adder can be converted to a full subtractor with the inclusion of an inverter.

Or

16. (a) Implement a full adder circuit using a decoder and two OR gates.

(b) Draw the logic diagram of an 8-bit 2's complement adder/substractor.

Module 4

17. Draw a clocked and gate SET/RESET flip-flop circuit diagram using fundamental gates and explain the working. What are its applications ?

Or

18. Design and draw the circuit of a 4-bit register using positive edge triggered D flip flops to operate as given :

Mode select	*Operation*
00	Hold
01	Synchronous clear
10	Compliment content
11	Circular shift right

Module 5

19. Design a synchronous counter to count from 0000 to 1001 using JK flip flop using minimum gates starting from the excitation table. Draw the circuit diagram

Or

20. Explain how combinational logic may be implemented using a ROM. Illustrate the procedure by designing a ROM implementation for a circuit which accepts a 3-bit number and generates a binary number which is equivalent to $x^3 + 2$ where x is the decimal equivalent of the 3 bit input.

(5 × 12 = 60 marks)

F 9323 (Pages : 3) Reg. No..... ECE

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(2002 admissions onwards—Supplementary)

[Common to all branches]

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 $x^2 y dx = (x^3 - y^3)\, dy$; $y(1) = 1$. (5 marks)

(b) Solve $y' = \dfrac{2x + 2y - 1}{3x + y - 2}$. (5 marks)

(c) A tank contains 100 litres of fresh water. 2 litres of brine, each containing 1 gm of dissolved salt, run into the tank per minute, and the mixture kept uniform by stirring uniformly. Water runs out at the rate of 1 litre per minute. Find the amount of salt present when the tank contains 150 litres of brine. (10 marks)

Or

(d) Solve $y = x + 2\tan^{-1} p$. (5 marks)

(e) Solve $e^{4x}(p-1) + e^{2y} p^2 = 0$. (5 marks)

(f) Calculate the amount of heat passing through 1 cm^2 of a refrigerator wall, if the thickness of the wall is 6 cm and the temperature inside the refrigerator is 0°C while outside it is 20°C. Assume k = 0.0002. (10 marks)

Module 2

2. (a) Solve $q(p - \cos x) = \cos y$. (5 marks)

(b) Solve by Charpit's method : $pxy + pq + qy = yz$. (8 marks)

(c) Solve $\dfrac{\partial^2 z}{\partial x^2} - 2\dfrac{\partial^2 z}{\partial x \partial y} + \dfrac{\partial^2 z}{\partial y^2} = \sin x$. (7 marks)

Or

Turn over

(d) Find the complete solution of :

$$\frac{\partial^3 z}{\partial x^3} - 4\frac{\partial^3 z}{\partial x^2 \partial y} + 4\frac{\partial^3 z}{\partial x \partial y^2} = 4\sin(\quad + y).$$

(10 marks)

(e) A tightly stretched string with fixed ends points $x = 0$ and $x = l$ is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from rest from its position, find the displacement $y(x, t)$.

(10 marks)

Module 3

2. (a) Find the Fourier Integral representation of the function :

$$f(x) = \begin{cases} c, & x < 0 \\ 1/2, & x = 0 \\ e^{-x}, & x > 0 \end{cases}$$

(8 marks)

(b) Find the Fourier sine and cosine transforms of $2e^{-5x} + 5e^{-2x}$.

(12 marks)

Or

(c) Using Parseval's identity show that $\int_0^\infty \frac{x^2 dx}{(1+x^2)^2} = \pi/4$.

(10 marks)

(d) Solve the integral equation $\int_0^\infty f(\theta)\cos\alpha\theta\, d\theta = \begin{cases} 1-\alpha, 0 \le \alpha \le 1 \\ 0, \quad \alpha > 1 \end{cases}$ Hence evaluate $\int_0^\infty \frac{\sin^2 t}{t^2} dt = \frac{\pi}{2}$.

(10 marks)

Module 4

4. (a) The probability that a man aged 70 will live to be 75 is 0.65. What is the probability that out of ten men now 70, at least 7 would live to be 75 ?

(8 marks)

(b) An aptitude test for selecting design Engineers in an IT firm is conducted on 1000 candidates. The average score is 42 and the standard deviation of score is 24. Assuming normal distribution for the scores, find :

(i) The number of candidates whose scores exceed 60.

(ii) The number of candidates whose scores lie between 30 and 60.

(12 marks)

(c) In a certain factory turning razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Use Poisson distribution to calculate the approximate number of packets containing no defective, one defective and three defective blades respectively in a consignment of 10,000 packets.

(12 marks)

(d) Find the equation of the best fitting normal curve to the following distribution :

x:	0	1	2	3	4	5
y:	13	23	34	15	11	4

(8 marks)

Module 5

5. (a) In a group of 50 first cousines there were found to be 27 males and 23 females. Ascertain if the observed proportions are inconsistent with the hypothesis that the sexes should be in equal proportion ?

(10 marks)

(b) Fit a binomial distribution to the data :

x:	0	1	2	3	4	5
f:	36	144	340	282	163	25

and test for goodness of fit, at the level of significance 0.05.

(10 marks)

Or

(c) The correlation between height and weight in a sample of 200 ten year old boys is 0.7 and the correlation between height and weight in a sample of 250 ten year old girls is 0.62. Is the difference significant ?

(10 marks)

(d) A research worker wishes to estimate mean of a population by using sufficiently large sample. The probability is 95% that sample will not differ from the true mean by more than 25% of the S.D. How large a sample should be taken ?

(10 marks)

[5 × 20 = 100 marks]

20. Given two random processes X (t) and Y(t) as

$X(t) = Z_1(t) + 3Z_2(t - \tau)$

$Y(t) = Z_2(t + \tau) + 3Z_1(t - \tau)$, here $Z_1(t)$ and $Z_2(t)$ are independent while noise processes each with a variance equal to 0.5. Determine :

(a) Autocorrelation functions of X(t) and Y(t).

(b) Cross correlation function of X (t) and Y (t).

(5 × 12 = 60 marks)

F 9357 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

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

SIGNALS AND SYSTEMS (L A S T)

(2002 admission onwards–Supplementary)

Time : Three Hours Maximum : 100 Marks

Missing datas can be suitably assumed.

Part A

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

1. How will you define invertibility property of a continuous time system ? Give an example.
2. Determine whether the following continuous time systems are causal or non causal :

   (i) $y(t) = x(2t)$

   (ii) $y(t) = \int_{-\infty}^{t} x(t)dt.$
3. State and prove time differentiation property of Fourier Transform.
4. Find the Fourier Transform of the signal $x(t) = t\,e^{-\alpha t}\,u(t)$. What is the restriction on α for the Fourier Transform to exist ?
5. Find the DTFT of the causal exponential sequence defined by $x(n) = a^n\,u(n)$.
6. Determine the time domain signal corresponding to the Fourier Transform $x(jw) = e^{-2w}u(w)$.
7. State and prove the time reversal property for z-transform.
8. Find the Laplace Transform of $t \cos(w_0 t)\,u(t)$.
9. State the autocorrelation theorems for energy signals and for power signals.
10. Define cross-correlation of two Discrete Time energy signals. How and why is this expression for cross-correlation modified in the case of Discrete Time power signals ?

(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. Test the periodicity of the following functions and find their fundamental intervals :

(i) e^{at}. (ii) e^{jat}.

(iii) $\cos 5\pi t$. (iv) $\sin 8t$.

(v) $\cos(3\pi t) - \sin(6\pi t)$. (vi) $\sin^2(4t)$.

(6 × 2 = 12 marks)

Or

12. (i) A continuous time LTI system is described by $\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 4y(t) = 6x(t)$. Find the output for the system when the input signal is $x(t) = e^{-2t}u(t)$.

(8 marks)

(ii) Show that a discrete time LTI system is BIBO stable if its impulse response $h(n)$ is absolutely summable ?

Module 2

13. (i) $x(t)$ is a periodic function with a period $T_0 = \frac{1}{f_o}$ and is continuous. Show that $\dot{x}(t)$ is also periodic function with the same period. How are the complex exponential Fourier series coefficients of $\dot{x}(t)$ related to those of $x(t)$?

(6 marks)

(ii) Find the frequency response of a continuous time LTI system represented by the impulse response $h(t) = e^{-|t|}$.

(6 marks)

Or

14. (i) Determine the complex exponential Fourier series expansion of the periodic signal

$$x(\theta) = \begin{cases} A\sin\theta, & 0 \le \theta \le \pi \\ 0, & \pi \le \theta \le 2\pi \end{cases}$$

(8 marks)

(ii) Determine the time domain signal $x(t)$ corresponding to the Fourier Transform

$$X(jw) = \frac{1}{(jw)^2 + j7w + 12}.$$

(4 marks)

Module 3

15. A discrete time signal is defined by $x(nT) = \begin{cases} 1 & |n| \le 3 \\ 0, & |n| > 3 \end{cases}$. The sampling interval T = 0.1 sec. Determine and sketch the amplitude and phase spectra of this signal.

Or

16. (i) Find the inverse DTFT of $X(\Omega) = \frac{3 - \frac{5}{4}e^{-j\Omega}}{\frac{1}{3}e^{-j2\Omega} - \frac{3}{4}e^{-j\Omega} + 1}$.

(6 marks)

(ii) Determine the DTFS representation for the sequence $x(n) = \cos^2\left(\frac{\pi}{8}\right)n$. (6 marks)

Module 4

17. (a) Find the inverse z-transform using partial fraction method

$$x(z) = \frac{-1 + 5z^{-1}}{\left(1 - \frac{3}{2}z^{-1} + \frac{1}{2}z^{-2}\right)} \text{ with ROC } |z| > |.$$

(8 marks)

(b) Find the z-transform of a ramp sequence. (4 marks)

Or

18. (a) Explain how frequency response is obtained from poles and zeros. (6 marks)

(b) Explain z-transform and ROC of the following sequence $x[n] = -b^n u[-n-1]$. (6 marks)

Module 5

19. (a) Find the autocorrelation function and energy spectral density of the signal

$$x(t) = e^{-t}u(t).$$

(8 marks)

(b) The probability density function (PDF) of a continuous random variable is of the form

$f_x(x) = \frac{1}{2}e^{-|x|}$ for $-\infty < x < \infty$. Determine the mean of the random variable.

(4 marks)

Or

F 9337 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

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

COMMUNICATION ENGINEERING–I (LAS)

(2002 Admission onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. An AM broadcast transmitter radiates 10 kW when the modulation is 0.6. How much of this is carrier power ? Also compute the power of each side-band.
2. An FM wave is defined by $s(t) = 20 \cos\left(10^6\ \pi t + \sin(4\pi t)\right)$. Calculate the instantaneous frequency of $s(t)$.
3. List and explain two conditions that must be observed at all times regarding the operation of varactor diodes.
4. Explain why it is not practicable to use a reactance modulator in conjunction with a crystal oscillator.
5. Describe the tracking method for a superheterodyne receiver.
6. Explain the need for AGC in radio receiver system.
7. What are the approximate frequency limits of the mechanical filter ?
8. Why could J3E not be used for "compatible" broadcasting ? What form of SSB might be so used ?
9. What are side tone and antiside tone ? What are their role in telephony ?
10. What circuit in the fax machine makes the fax signal compatible with the telephone line ? How it is achieved ?

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) How many times larger is the peak voltage in a 100 % modulated wave compared to the peak voltage in the unmodulated carrier ?

    (b) Calculate the power in the radiated wave for a 500 V_{rms} carrier applied to a 50 Ω antenna.

    (c) A 1120 kHz carrier is modulated to 75 % by a 2 kHz tone signal. What are the frequencies that would be transmitted in this signal ?

Or

Turn over

12. (a) An FM transmitter has a carrier oscillator with a rest frequency of 3.5 mHz. The oscillator shifts frequency by ±1.6 kHz when 3.6 V_{pp} message signal is applied. The frequency multiplier section has three frequency triplers. Calculate the transmitted carrier rest frequency f_c, the deviation Δf_c, and the percentage of modulation at the antenna.

(b) Of the various advantages of FM over AM, identify and discuss those due to the intrinsic qualities of frequency modulation.

Module 2

13. Draw the block diagram of a low level solid state AM transmitter. With the circuit diagrams, explain each block used.

Or

14. Starting with an oscillator working near 500 kHz and using a maximum frequency deviation not exceeding ±30 Hz at that frequency, calculate the following for an Armstrong system which is to yield a centre frequency precisely 97 MHz with a deviation of exactly 75 kHz ;

(a) starting frequency.

(b) exact initial deviation.

(c) frequency of the crystal oscillator.

(d) amount of frequency multiplication in each group.

Module 3

15. Describe the general process of frequency changing in a superheterodyne receiver. What are some of the devices that can be used as frequency changes ? Explain with circuit diagrams. Why must some of them be separately excited ?

Or

16. Explain the operation of the balanced slope detector, using a circuit diagram and a response characteristics. Discuss, in particular, the method of combining the outputs of the individual diodes. In what ways is this circuit an improvement on the slope detector, and, in turn, what are its disadvantages ?

Module 4

17. With circuit diagram and deriving equations, prove that the balanced modulator produces an output consisting of side-bands only, with the carrier removed. Other than in SSB generation, what applications this circuit have ?

Or

18. Define and describe VSB transmission. Where it is used ? Compare its performance with AM, SSB and FM.

Module 5

19. (a) Draw a neat waveform showing the dialling impulses sent over subscriber's local loop by the dialler.

(b) Discuss the various methods of coupling the carrier equipment to the powerline in powerline carrier communication systems.

Or

20. (a) Give diagram of antiside tone circuit and explain its working.

(b) What is call congestion ? What is time congestion ? Explain Grade of service for Telephone systems.

(5 × 12 = 60 marks)