F 3477 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

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

DIGITAL ELECTRONICS AND LOGIC DESIGN (LAS)

(Prior to 2007 Admissions/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the applications of EX-OR gates ?
2. Draw the CMOS Inverter circuit and explain.
3. Draw the block diagram of a demultiplexer and explain. What are its applications ?
4. Simplify the expression $Y = ABC + \bar{A}BC + A\bar{B}C + AB\bar{C} + A\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}\bar{B}\bar{C}$.
5. Draw the circuit of a half adder using NAND gates only.
6. What are signed binary numbers ? Explain with examples.
7. What are D latches ? What are its applications ?
8. Convert a RS flip-flop to a T flip-flop.
9. What are buffer registers ? Explain.
10. Compare ROMs and EPROMs.

(10 × 4 = 40 marks)

Part B

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

11. (a) Draw the circuit of an open-collector AND gate and explain. What are its applications ? (7 marks)

    (b) Describe the sourcing and sinking characteristic of a gate. (5 marks)

Or

12. Draw the circuit of a CMOS NOR gate and explain its working. Compare CMOS and TTL gates. (12 marks)

Turn over

13. Simplify using Karnaugh Map and implement the function using NOR gates only.

$$f(A, B, C, D) = \sum_{m}(0, 1, 2, 5, 6, 10, 11) + \sum_{d}(3, 8, 13, 15).$$

(12 marks)

Or

14. (a) Implement the function using a 16 : 1 multiplexer :

$$f(A, B, C, D) = \Sigma_m\ (0, 1, 2, 5, 8, 13, 15).$$

(6 marks)

(b) Explain encoders and decoders with examples. What are their applications ? (6 marks)

15. Draw the circuit of a parallel binary adder cum subtractor and explain the working with an example.

Or

16. Draw the circuit of a 2's complement adder cum subtractor and explain its working. (12 marks)

17. Draw the circuit of an MSJK flip-flop using NOR gates only and explain. Explain how racing can be avoided by MSJK.

Or

18. Draw the truth table for a positive edge triggered JK flip-flop with waveforms and explain. Compare with RS flip-flop.

(12 marks)

19. Design a counter with the irregular binary count sequence 1, 4, 3, 2, 5, 0, 6, 1... Use T flip-flops. Draw the waveforms.

(12 marks)

Or

20. (a) Explain with diagram the 4-bit bidirectional shift register. (6 marks)

(b) Explain with diagram and waveforms a 4-bit ring counter. (6 marks)

[5 × 12 = 60 marks]

F 3486 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

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

COMMUNICATION ENGINEERING—I (L A S)

(Prior to 2007 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Compare the spectra of AM and FM signals.
2. Discuss the merits and demerits of FM.
3. Explain the basic principle of a square law modulator.
4. How is FM generated using varactor diode ?
5. What are the characteristics of TRF receiver ?
6. What are pre-emphasis and de-emphasis ?
7. What are the advantages and disadvantages of supressed carrier systems ?
8. What is VSB transmission ? How is it achieved in TV systems ?
9. Compare pulse and tone signalling.
10. What is a repeater ? Discuss its significance.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Derive an expression for a frequency modulated signal. Comment on the spectrum of the modulated signal.

Or

Turn over

(b) A sine wave 50 sin $10^5 \pi t$ is amplitude modulated by the signal $\left[3 \sin 2 \times 10^3 \pi t + 5 \sin 6 \times 10^3 \pi t\right]$. Sketch the spectrum of the modulated signal and determine the average power when the wave is fed to a 50 Ω load.

12. (a) Draw the circuit of a transistorized AM generator. Explain its working. What are the advantages of solid state modulators ?

Or

(b) Draw the circuit or a reactance modulator and explain its principle of operation. Compare its performance with Armstrong modulator.

13. (a) Draw the block diagram of a superheterodyne receiver. Explain the function of each block.

Or

(b) Draw the circuit of a slope detector. Explain its working. What are its characteristics ?

14. (a) What are the characteristics of pilot carrier SSB generator ? Explain the working of a double superheterodyne receiver.

Or

(b) Draw and explain the circuit of a VSB transmitter.

15. (a) Explain with a block diagram the principle of operation of a telephone set. Compare operator's and subscriber's telephone circuits.

Or

(b) Explain with a block diagram the principle of working of a FAX transmitter.

(5 × 12 = 60 marks)

F 3495 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

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

ELECTRONIC CIRCUITS—II (LAS)

(Prior to 2007 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. What are the characteristics of double tuned amplifiers ?
2. Explain how cascading affect the frequency response of amplifiers.
3. Differentiate between series feedback and shunt feedback.
4. Compare emitter follower and darlington emitter follower.
5. Describe the conditions for oscillation.
6. What are the characteristics of crystal oscillator ?
7. Differentiate between multivibrators and oscillators.
8. What is a commutating capacitor ?
9. Differentiate between small signal amplifiers and large signal amplifiers.
10. What are the applications of time base generators ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Derive the equations for the parameters of high frequency conductances in terms of *n*-parameters.

Or

(b) Discuss the choice of transistor configurations in a cascaded amplifier.

Turn over

12. (a) Explain the different feedback arrangements used in amplifiers.

Or

(b) Explain with diagrams the principle of operation of a difference amplifier.

13. (a) Design an RC-phase shift oscillator to generate a sine wave of 1.2 kHz.

Or

(b) Explain with circuit diagram the working of Colpitt's Oscillator.

14. (a) Design a monostable multivibrator to produce a square wave of 2 kHz.

Or

(b) Explain with circuit diagram the working of a Schmitt trigger.

15. (a) How is crossover distortion eliminated in Class AB amplifier ? Discuss in detail.

Or

(b) Explain with a circuit diagram the principle of operation of a linear sweep generator. What are its characteristics and applications ?

(5 × 12 = 60 marks)

F 3511 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

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

RELIABILITY AND HUMANITIES (L, A, S)

(Prior to 2007 Admissions—Supplementary)

Time : Three Hours Maximum : 100 Marks

Use of Statistical tables permitted.
Answer **all** *questions.*
Each question carries 20 *marks.*

Module 1

1. (a) Define reliability with suitable examples explain various measures of reliability. (9 marks)

(b) An electronic component reliability is described by the following function $R(t) = e^{-(1/\beta)t^2}$ where β is the scale parameter and t is the time. Obtain an expression for the component mean time to failure (MTTF). (11 marks)

Or

2. (a) Explain how failures are classified. Explain with suitable examples. (7 marks)

(b) Prove that mean time to failure of a redundant system is MTTF = $\frac{1}{\lambda}+\frac{1}{2\lambda}+\frac{1}{3\lambda}$ when λ in each unit constant failure rate. (9 marks)

(c) Define the term MTBF and MTTF. (4 marks)

Module 2

3. (a) Explain two hazard models used in failure analysis. (10 marks)

(b) An electronic component failure times are defined by the following failure density function

$$f(t)=\frac{2}{\lambda}te^{-(1/\beta)t^2} \text{ for } t \geq 0, \lambda > 0 \text{ where } \lambda$$

is the scale parameter, t is the time. Develop an expression for the component hazard rate. (10 marks)

Or

4. (a) With a neat graphical sketch of bathtub hazard rate curve explain the importance of the following :—

   (i) Burn-in-region.

   (ii) Useful life region.

   (iii) Wear-out-region.

   (10 marks)

   (b) A UPS is associated with six SMF batteries, each connected in series. If the probability of successful operation of each battery in the system is 0.96, calculate to reliability. (10 marks)

Module 3

5. (a) Explain the basic concepts of sequencing. (10 marks)

   (b) Comment on the need of prototype tests in quality and reliability of a manufacturing component. (10 marks)

Or

6. (a) Define quality. Explain the term quality of conformance. (10 marks)

   (b) The quality of a component is related to cost. Comment on the results. (10 marks)

Module 4

7. (a) Explain the concept and characteristics of quality control. (7 marks)

   (b) What are the benefits of quality control ? (5 marks)

   (c) Explain how the step wise quality circle may be implemented ? (8 marks)

Or

8. (a) Explain the purpose and advantages of control charts. (5 marks)

   (b) Explain the applications of control charts. (6 marks)

   (c) Explain how the zero defects (ZD) programme may be implemented. (9 marks)

Module 5

9. (a) Explain the applications of industrial psychology. (5 marks)

   (b) With the aid of a sketch explain the Maslow's theory of motivation. (10 marks)

   (c) Distinguish between Wages and Incentives. (5 marks)

Or

10. (a) What are the methods to be used in solving the grievances of workers ? (7 marks)

    (b) Explain how the industrial disputes may be settled. (7 marks)

    (c) Comment on the ERG theory of motivation. (6 marks)

[5 × 20 = 100 marks]

F 3504 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch : Electronics and Communication, Information Technology, Applied Electronics and Instrumentation, Electronics and Instrumentation Engineering

SIGNALS AND SYSTEMS (L, T, A, S)

(Prior to 2007 Admissions – Supplementary)

Time : Three Hours Maximum : 100 Marks

Missing Data may be suitably assumed.

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. Define and plot the following signals : unit impulse, unit step, unit ramp and exponential signal.
2. What is meant by causality and stability?
3. List any *four* properties of Fourier Transform.
4. State and explain sampling theorem.
5. Find the discrete Fourier Series of $x(n) = \{1, 1, 0, 0\}$.
6. Find the DTFT of the signal $x(n) = \{1, 2, \underset{\uparrow}{3}, 2, 1\}$.
7. What is ROC i Laplace transform and what are its properties?
8. Find the inverse z-transform of $X(z) = \dfrac{z}{2z^2 - 3z + 1}$.
9. What is Bayes theorem? Explain.
10. The P.D.F. of a random variable X is given by $f_x(X)$. A random variable Y is defined as $Y = aX + b$ where $a < 0$. Determine PDF of Y in terms of PDF of X.

(10 × 4 = 40 marks)

Part B

Answer **either** *(a)* **or** *(b) section of each module.*

Each full question carries 12 *marks.*

Module I

11. (a) (i) Convolute the two continuous time signals $x_1(t)$ and $x_2(t)$ given below :

$$x_1(t) = \text{Cos}\ \pi t\ [u(t+1) - u(t+3)] \quad x_2(t) = u(t).$$

(ii) List the properties of convolution sum.

(8 + 4 = 12 marks)

Or

Turn over

(b) (i) Find the step response of an LTI system, whose impulse response is define by

$h(n) = \frac{1}{3}\sum_{k=0}^{2} 8(n-k)$.

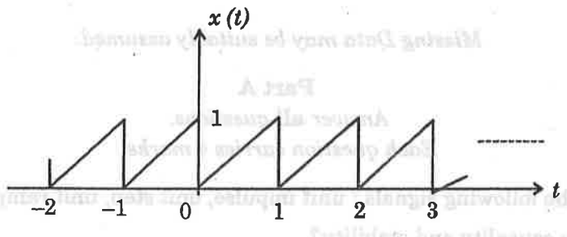
(ii) For the differential equation given below, find the natural and forced response

$y''(t) + 4y'(t) + 4y(t) = 2e^{-2t}\,u(t)\; y(0) = 0,\; y'(0) = 1$.

(6 + 6 = 12 marks)

MODULE II

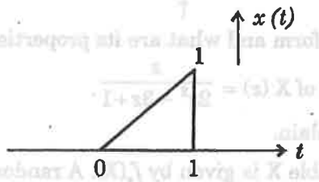
12. (a) Find the complex Fourier coefficient for the periodic waveform $x(t)$ shown in figure. Draw the amplitude and phase spectra.



(12 marks)

Or

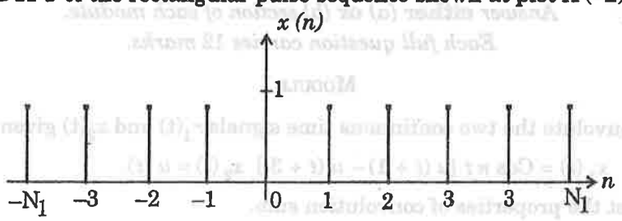
(b) Find the real and imaginery parts of the Fourier Transform of the pulse $x(t)$ shown in figure.



(12 marks)

MODULE III

13 (a) Find the DTFT of the rectangular pulse sequence shown at plot X (–2).



Or

(12 marks)

(b) (i) State and explain Parseval's theorem.

(ii) Find $x(n)$ for $x(k)$ given below :

$$X(k) = \cos\left[\frac{6\pi}{17}k\right].$$

MODULE IV

14. (a) (i) State and prove the following theorem in Laplace Transform. Shifting theorem, Initial value theorem and Final value theorem.

(ii) Obtain the relation between S plane and z-plane.

(8 + 4 = 12 marks)

Or

(b) Find the z-transform of

(i) $x(n) = \left(\frac{1}{2}\right)^n \cos(an)(n)$.

(ii) $x(n) = \left(\frac{1}{2}\right)^n$, n – even

$= 3^n 1$, n – odd.

(12 marks)

15. (a) (i) Explain random process, stationary process, non-stationary process and time average.

(ii) Show that energy spectral density and autocorrelation are Fourier transform pairs.

(5 + 7 = 12 marks)

Or

(b) The PDF of a continuous random variable is said to have Laplace distribution given by

$f_X(\alpha) - \frac{1}{2}\overline{e}^{|x|}$, $-\alpha < x < \alpha$.

Find the mean, mean square value and variance of the random variable.

(12 marks)

[5 × 12 = 60 marks]

F 3473 (Pages : 3) Reg. No. ECE

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

ENGINEERING MATHEMATICS—III

(Common for all branches)

[Prior to 2007 Admissions—Supplementary]

Time : Three Hours Maximum : 100 Marks

Answer one full question from each module.
Statistical tables permitted.

Module 1

1. (a) Solve $y'' + 3y' + 2y = e^{-2x} + \sin 2x$. (7 marks)

(b) Solve $(D^2 + 6D + 9)y = (x^2 + 1)\sinh x$. (7 marks)

(c) Solve by the method of variation of parameters $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = e^x \tan x$. (6 marks)

Or

2. (a) Solve $(D^2 + 4)\, y = x^2e^{-x} + \sin 2x$. (7 marks)

(b) Solve $x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 12y = x^3 (\log x)^2$. (6 marks)

(c) Solve the system of simultaneous equations :

$$\frac{dy}{dx} + 2y - 3z = x$$

$$\frac{dz}{dx} + 2z - 3y = e^{2x}.$$

(7 marks)

Module 2

3. (a) Solve $2zx - px^2 + 2pxy + pq = 0$. (5 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = x + y$. (5 marks)

Turn over

(c) A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. If it is set vibrating by giving to each of its points a velocity $\lambda x\ (l - x)$, find the displacement of the string at any distance x from one end at any time t.

(10 marks)

Or

4. (a) Form the partial differential equation from $z = f(x + it) + g(x - it)$. (5 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x\, \partial y} - 6\frac{\partial^2 z}{\partial y^2} = y \cos x$. (5 marks)

(c) An insulated rod of length 'l' has its ends A and B maintained at 0°C and 100°C respectively until steady state conditions prevail. If B is suddenly reduced to 0°C and maintained at 0°C find the temperature at a distance x from A at time t. (10 marks)

Module 3

5. (a) Express $f(x) = \begin{cases} 1, \text{ for } |x| \le 1 \\ 0, \text{ for } |x| > 1 \end{cases}$ as a Fourier integral. (5 marks)

(b) Find the Fourier transform of $e^{-x^2/2}$. (7 marks)

(c) Find the Fourier sine and cosine transforms of $f(x) = e^{-ax}\ (a > 0)$. (8 marks)

Or

6. (a) Using Fourier integral prove that $\int_0^\infty \frac{\cos \lambda x}{1 + \lambda^2}\, d\lambda = \frac{\pi}{2} e^{-x}\ (x \ge 0)$. (6 marks)

(b) Find the Fourier transform of $f(x) = \begin{cases} 1, |x| < 1 \\ 0, |x| > 1 \end{cases}$. Hence evaluate $\int_0^\infty \frac{x \sin x}{x}\, dx$. (7 marks)

(c) Find the Fourier sine transform of $e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{x \sin mx}{1 + x^2}\, dx$. (7 marks)

Module 4

7. (a) In a certain factory producing cycle tyres there is a small chance of one in 500 tyres to be defective. The tyres are supplied in lots of 20. Calculate the approximate number of lots containing no defective, one defective and two defective tyres in a consignment of 20000 tyres.

(10 marks)

(b) In an intelligence test conducted on 1000 students the mean was 42 and S.D. 24. Assuming the normality of the distribution, find (i) how many students score between 30 and 54 ; (ii) how many score about 60.

(10 marks)

Or

8. (a) Fit a binomial distribution for the following data and calculate the theoretical frequencies :

x :	0	1	2	3	4	5	6
f :	13	25	52	58	32	16	4

(10 marks)

(b) Define Poisson distribution. Determine its mean and variance. (10 marks)

Module 5

9. (a) An I.Q. test was given to two different sets of college students and the results are given below :

	Mean	S.D.	Size
Set I ...	75	7	90
St II ...	73	5	120

Is the difference between the means significant ?

(10 marks)

(b) Out of a consignment of one lakh tennis balls, 400 were selected and out of them 20 were found to be defective. How many defective balls you can reasonably expect to have in the consignment at 5% level of significance ?

Or

(10 marks)

10. (a) S^2 is the variance of a sample of size 10 taken from a normal population with S.D. 5. Find the probability that S^2 will lie between 8.4 and 42.3.

(10 marks)

(b) If two independent sample of sizes $n = 26$ and $n_2 = 8$ are taken from a normal population, what is the probability that the variance of the second sample will be at least 2.4 times the variance of the first sample.

(10 marks)

[5 × 20 = 100 marks]