G 2098 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2010

Fourth Semester

Branch : E & C, AE & I, E & I Engineering

COMMUNICATION ENGINEERING—I (LAS)

[2008 admissions—Regular/2007 admissions—Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Compare the bandwidth requirements of AM, FM and PM.
2. Derive the power contents in the frequency components of a single tone AM signal.
3. What are the merits and demerits of solid-state modulators ?
4. Compare direct and indirect methods of generating FM.
5. Discuss the need for an IF stage in radio receivers.
6. Compare simple and delayed AGC.
7. What are the advantages of SSB systems ?
8. How is VSB achieved in TV systems ? What is its advantage ?
9. What is a side tone ? What is its significance ?
10. What are the merits and demerits of power line communication systems ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Explain, why modulation is needed in communication system. Compare the performance of AM, FM and PM systems.

Or

(b) Derive an expression for the instantaneous amplitude of an FM wave. Plot the spectrum for $m_f = 0.5$ and $m_f = 5.0$.

12. (a) Draw the block diagram of an AM transmitter which uses high level modulation and explain its operation. What are the modifications required if the modulated is done at low level ?

Or

(b) Explain the working of an FM transmitter employing Armstrong method. What are functions of pre-destorter and pre-emphasis circuits.

Turn over

13. (a) What are the parameters of a radio receiver ? Which components affect the above parameters ?

Or

(b) Draw and explain the circuit of a phase descriminator. How is AFC ahieved in receivers ?

14. (a) Draw the circuit of a SCSSB balanced modulator. Explain its workng. What are the advantages of suppressed carrier systems.

Or

(b) Draw and explain the circuit of VSB transmitter. Under what conditions do VSB modulation preferred.

15. (a) Explain with a basic block diagram the principle of EPABX.

Or

(b) Explain with a block diagram the working of a Facsimile receiver.

(5 × 12 = 60 marks)

G 2107 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2010

Fourth Semester

Branch : E & C, AE & I, E & I Engineering

ELECTRONIC CIRCUITS—II (LAS)

[2008 admissions—Regular/2007 admissions—Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Which components affect the high frequency response of amplifiers ?
2. Compare the frequency responses of single stage and multistage amplifiers.
3. Discuss the applications of positive and negative feedbacks.
4. What is an emitter follower ? Explain its applications.
5. Draw and explain the general form of an oscillator circuit.
6. Draw and explain the equivalent circuit of a crystal and discuss how it is used in an oscillator circuit.
7. Explain the triggering circuits used for multivibrators.
8. What is a Schmitt trigger ? Discuss its applications.
9. Explain the reason for harmonic distortion in large signal amplifiers.
10. Differentiate between Sweep generators and Timebase generators.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Derive the hybrid π model of a transistor in the CE configuration. What are the advantages of this representation ?

Or

(b) Draw and explain the working of a double tuned amplifier. Discuss its frequency response.

12. (a) Explain the effects of different feedback configurations on the performance of amplifiers.

Or

(b) Draw and explain a darlington pair circuit. What are its characteristics and applications ?

Turn over

13. (a) Design and draw the circuit of an RC phase-shift oscillator to produce a sinewave of 500 Hz.

Or

(b) Draw and explain the working of a Hartley oscillator. Derive an expression for its frequency of oscillation.

14. (a) Design a bistable multivibrator to generate a square wave of 1.5 kHz. Draw the circuit of the designed circuit.

Or

(b) Explain the steps involved in the design of a Schmitt trigger.

15. (a) Discuss how the efficiency of a class A power amplifier is improved by the transformer coupled amplifier configuration.

Or

(b) Explain with a circuit diagram the working of bootstrap sweep generator.

[5 × 12 = 60 marks]

G 2089 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2010

Fourth Semester

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

DIGITAL ELECTRONICS AND LOGIC DESIGN (LAS)

[2008 admissions—Regular/2007 admissions—Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. State and prove the De Morgan's theorems.
2. Draw the tristate inverter and explain. What are its advantages ?
3. Implement the function using an 8 : 1 multiplexer :

   $f(A, B, C) = \Sigma m (0, 2, 3, 5, 7)$.
4. Simplify $y = ABC(AB\bar{C} + A\bar{B}C + \bar{A}BC)$.
5. Substract using 1's and 2's complements the following numbers :—

   (i) 1001101 – 101101 ; (ii) 110110 – 1100110.
6. Draw the circuit of a half adder using NOR gates only.
7. Draw the circuit of a clocked RS flip-flop and explain its working with the advantages of clocking.
8. Explain race round condition with waveforms.
9. What are the different types of RAMS ? Explain.
10. Draw the diagram of a 4-bit ring counter and explain.

(10 × 4 = 40 marks)

Part B

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

11. (a) Draw the circuit of a CMOS NAND and NOR gate and explain their working. (8 marks)

    (b) Define fan-in and fan-out of gates. (4 marks)

Or

12. (a) Draw the circuit of a TTL NAND gate and explain its working. (7 marks)

    (b) Explain the applications of EX-OR gates. (5 marks)

Turn over

13. (a) Explain encoders and decoders with examples. What are their applications ? (8 marks)

(b) Explain don't care conditions with examples. (4 maks)

Or

14. Simplify the function usng Karnaugh map and implement the function using NAND gates only :

$$f(A, B, C, D) = \sum_{m}(0, 2, 4, 5, 10, 11, 15) + \sum_{d}(1, 9, 12, 14).$$

(12 marks)

15. Design a full adder using NOR gates only and explain. What are the applications ? (12 marks)

Or

16. (a) What are signed binary numbers ? Explain with examples. (5 marks)

(b) Draw the circuit of a 2's complement adder and explain. (7 marks)

17. (a) Draw the circuit of a JK flip-flop and explain its working. (6 marks)

(b) Convert the JK flip-flop to T and D flip-flops. What are the applications ? (6 marks)

Or

18. Draw the circuit of a MSJK flip-flop using NAND gates only and explain its working. What are its advantages over JK flip-flops ?

(12 marks)

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

(12 marks)

Or

20. (a) Draw the circuit of a synchronous BCD decade counter and explain with waveforms.

(6 marks)

(b) Draw the circuit of a 4-bit serial in/parallel out shfit register and explain with the timing diagram.

(6 marks)

[5 × 12 = 60 marks]

G 2085 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2010

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANUS)

(Common for all Branches)

[2008 admissions—Regular/2007 admissions—Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

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

Module 1

I. (a) Solve $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + y = \sin 4x \sin 2x$. (7 marks)

(b) Solve $\left(D^2 - 2D + 1\right) y = e^{-2x} \cos 2x + \left(2x^2 + 1\right) e^x$. (7 marks)

(c) Solve $x^2y'' + 5xy' + 4y = \cos(2 \log x)$. (6 marks)

Or

II. (a) Solve $\left(D^2 + 1\right) y = \left(x^2 - 1\right) \cos 2x$. (7 marks)

(b) Solve by the method of variation of parameters $y'' + y = \operatorname{cosec} x$. (6 marks)

(c) Solve the system of simultaneous linear equations

$$(5D + 4)x - (2D + 1)y = e^{-t}$$
$$(D + 8)x - 3y = 5e^{-t}$$

where $D = d/dt$. (7 marks)

Module 2

III. (a) Form the partial differential equation from $z = (x - a)^2 + (y - b)^2$. (6 marks)

(b) Solve $\left(x^2 - y^2 - z^2\right) p + 2xyq = 2xz$. (7 marks)

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

Or

Turn over

IV. (a) Solve $\left(p^2+q^2\right)y = qz$. (6 marks)

(b) Solve $\frac{\partial^3 z}{\partial x^3} - 3\frac{\partial^2 z}{\partial x \partial y} + 4\frac{\partial^3 z}{\partial y^3} = e^{x+2y}$. (7 marks)

(c) Find the solution of the one-dimensional wave equation using the method of separation of variables. (7 marks)

Module 3

V. (a) Express $f(x) = \begin{cases} 1, & \text{for } 0 \le x \le \pi \\ 0, & \text{for } x > \pi \end{cases}$ 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 cosine transform of $f(x) = \frac{1}{\left(1+x^2\right)}$ and hence derive the Fourier sine transform of $\phi(x) = \frac{x}{\left(1+x^2\right)}$.

(10 marks)

Or

VI. (a) Find the Fourier transform of $f(x) = \begin{cases} 1-x^2, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$ and hence evaluate $\int_0^\infty \left\{\frac{x\cos x - \sin x}{x^3}\right\} \cos\left(\frac{x}{2}\right) dx$.

(8 marks)

(b) Find the Fourier sine transform of $\frac{1}{x\left(x^2+a^2\right)}$. (6 marks)

(c) Find the Fourier cosine transform of $e^{-x^2/2}$. (6 marks)

Module 4

VII. (a) Define binomial distribution. Find the mean and variance of the binomial distribution.

(10 marks)

(b) In a normal distribution 7 % of the items are under 35 and 10 % of the items are above 55. Find the mean and variance of the distribution.

(10 marks)

Or

VIII. (a) The probability that a pen manufactured by a company will be defective is 0.15. A random sample of 10 pens are chosen. What is the probability that in the sample (i) not more than one is defective ; (ii) at least 7 are good ; and (iii) all are good.

(10 marks)

(b) Fit a Poisson distribution for the following data and hence calculate the theoretical frequencies:—

x :	0	1	2	3	4	5
f :	142	156	69	27	5	1

(10 marks)

Module 5

IX. (a) A normal population has a mean 0.1 and S.D. 2.1. Find the probability that the mean of a sample of size 900 will be negative.

(10 marks)

(b) A random sample of size 18 is taken from a normal population with mean 28 and variance 49. Find the probability that the sample variance S^2 will be less than the population variance.

(10 marks)

Or

X. (a) In a random sample of size 500, the mean is found to be 20. In another independent sample of size 400, the mean is 15. Could the samples have been drawn from the same population with S.D. 4.

(10 marks)

(b) In a large city A, 20 % of a random sample of 900 school boys had a slight physical defect. In another city B 18.5 % of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant.

(10 marks)

[5 × 20 = 100 marks]

G 2123 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2010

Fourth Semester

Branch : E & C/Applied Electronics and Instrumentation/E & I

RELIABILITY AND HUMANITIES (L A S)

[2008 admissions—Regular/2007 admissions—Improvement/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 the term MTBF and MTTF. (4 marks)

(b) The MTBF of a component is 400 hours. What is the failure rate expressed in :

(i) % failure per hour ?

(ii) % failure per 10^5 hours ?

(iii) % failure per 10^3 hours ?

(9 marks)

(c) Prove that the MTTF of a redundant system is $MTTF = \frac{1}{\lambda} + \frac{1}{2\lambda} + \frac{1}{3\lambda}$ where λ is each unit constant failure rate. (7 marks)

Or

2. (a) Define reliability with suitable examples explain the various measurements of reliability. (5 marks)

(b) The reliability of an electrical component is described by the following function :

$R(t) = e^{-(1/\beta)t^2}$ where β is the scale parameter and t is the time to failure. (8 marks)

(c) Define and distinguish between MTBF and MTTF. (7 marks)

Module 2

3. (a) What are the reasons for the useful life region of the bath tub hazard rate curve ? What statistical distribution is applicable to represent the useful life region of that curve ? (10 marks)

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

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

where λ is the scale parameter, t is the time. Develop an expression for the component hazard rate.

(10 marks)

Or

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

(b) With the aid of a neat graphical sketch of bath tub hazard rate cure, explain the significance of following :—

(i) Burn-in-region.

(ii) Useful life region.

(iii) Wear-out region.

(10 marks)

Module 3

5. (a) Define Quality. Explain the quality of conformance. (10 marks)

(b) What are the different cost of quality ? Explain with the help of suitable examples.

(10 marks)

Or

6. (a) Explain the significance of the prototype tests, explain how the quality may be assured in the tests.

(10 marks)

(b) Explain the basic concepts of sequencing. (10 marks)

Module 4

7. (a) Comment on the benefits of quality control. (5 marks)

(b) Define the zero defects concept. How ZD may be implimented. (9 marks)

(c) Explain the concept of re-engineering. What are its advantages ? (6 marks)

Or

8. (a) Ten castings were inspected in order to locate the defects. Every castings was found to contain certain number of defects. It is required to plot a C-charts and draw the conclusions. No of defects are :

(i) 2, (ii) 4, (iii) 1 ; (iv) 5 ; (v) 6 ; (vi) 7 ; (vii) 0 ; (viii) 4 ; (ix) 5 ; (x) 4.

(13 marks)

(b) What are the significant features of C-charts ? List the areas of applications. (7 marks)

Module 5

9. (a) What steps may be taken to solve the grievances of workers. (6 marks)

(b) Comment on the applications of industrial psychology. (7 marks)

(c) Distinguish between the wages and incentives. (7 marks)

Or

10. (a) Explain the significance of theories of motivation. (6 marks)

(b) What are the limitations of Maslow's theory of motivation ? (7 marks)

(c) Explain the steps to be taken to reduce the industrial fatigues. (7 marks)

[5 × 20 = 100 marks]

G 2116 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2010

Fourth Semester

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

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

[2008 admissions—Regular/2007 admissions—Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Missing data can be suitably assumed.

Part A

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

1. Explain what is meant by power and energy signals. Give an example for each.
2. Check whether the following input-output relations are LTI or not :
   (i) $y(t) = 2x(t) + 7$.
   (ii) $y(t) = \int_{-\infty}^{t} x(\tau)\, d\tau$.
3. Find the Fourier transform of
   $x(t) = t, \quad 0 \le t \le 2$
   $= 0, \quad$ otherwise.
4. Explain the conditions for the existence of Fourier series representation.
5. State and explain Parseval's theorem.
6. What is frequency response of discrete time LTI system ? Explain its properties.
7. Explain the properties of ROC of z-transform.
8. Explain briefly the significance of poles and zeros.
9. Explain Random process, stationary process, non-stationary process and time average.
10. What are Random signals ? Explain with examples.

(10 × 4 = 40 marks)

Turn over

Part B

Answer **either** *(a)* **or** *(b) section of each module.*
Each full question carries 12 *marks.*

Module I

11. (a) (i) Find the convolution of the signal

$x(t) = e^{-t}, \quad t \geq 0$
$= 0, \quad t < 0$ with the signal

$h(t) = 1, \quad 0 \leq t \leq 2$
$= 0, \quad$ otherwise.

(7 marks)

(ii) Find the step response of an LTI system represented by the impulse response,

$h(n) = \left(\frac{1}{2}\right)^n u(n)$.

(5 marks)

Or

(b) (i) Find the even and odd parts of the signals :

(1) $x(n) = u(n)$ and (2) $y(n) = a^n u(n)$.

(6 marks)

(ii) A second order LTI system is described by the difference equation :

$$y(n) = \frac{3}{4} y(n-1) - \frac{1}{8} y(n-2) + x(n) - x(n-1).$$

Find the impulse response of the system.

(6 marks)

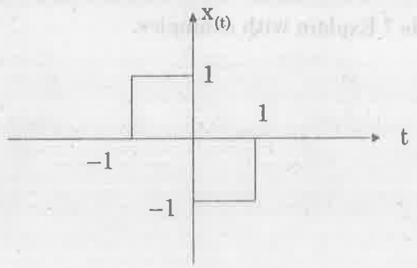
Module II

12. (a) (i) Find the Fourier series representation of a half-wave rectifier sinewave. (8 marks)

(ii) State and explain Sampling theorem. (4 marks)

Or

(b) Find the magnitude and phase spectrum of the signal shown below :



(12 marks)

Module III

13. (a) (i) State and prove convolution property of discrete Fourier transform. (4 marks)

(ii) Find the discrete-Fourier series representation of the periodic sequence $x(n) = \{1, 2, 3, 1\}$ with period N = 4.

(8 marks)

Or

(b) Find the DTFT of $x(n) = \left(\frac{1}{2}\right)^n u(n-4)$. Also find the magnitude and phase spectra.

(12 marks)

Module IV

14. (a) (i) State and prove initial and final value theorem in Laplace Transform. (6 marks)

(ii) Explain briefly the applications of Laplace Transform for the analysis of continuous time LTI system.

(6 marks)

Or

(b) (i) Find the *z*-transform and its ROC of :

$x(n) = \left(\frac{1}{2}\right)^n ; \quad n \geq 0$
$= 3^n ; \quad n < 0.$

(8 marks)

(ii) List any four properties of *z*-transform. (4 marks)

Module V

15. (a) (i) Define Gaussian random process. Explain its properties. (6 marks)

(ii) State and explain Bayes theorem. (6 marks)

Or

(b) Write short notes on :

(i) Probability density and distribution functions of random variable. (6 marks)

(ii) Auto and cross correlation. (6 marks)

[5 × 12 = 60 marks]