F 4827

(Pages : 2)

Reg. No...................................

Name....................................

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Electrical and Communication Engineering

APPLIED ELECTROMAGNETIC THEORY (L)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 4 marks.

1. Co-ordinates of a point in rectangular co-ordinate system is (1, 3, 2). Find the position vector in cylindrical and spherical co-ordinate systems.

2. Discuss the concepts of electric flux density and dielectric constant.

3. State and explain Helmholtz theorem.

4. Find the boundary conditions between two magnetic materials with different permeabilities.

5. Distinguish between wave propagation in conductors and insulators.

6. What do you mean by displacement current ? Give expression for the same.

7. Distinguish between TE and TM waves in a rectangular waveguide.

8. Compare wave propagation through coaxial cable and rectangular waveguide.

9. "A matched transmission line appears to be of infinite length." Justify the statement.

10. Show that the magnitude of the reflection coefficient for a lossless line having a purely reactive load is exactly unity.

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each full question carries 12 marks.

11. (a) State and prove Gauss's law. (6 marks)

    (b) A point charge of 16 nC is located at Q (2, 3, 5) in free space, and a uniform line charge of 5 nC/m. is at the intersection of planes $x = 2$ and $y = 4$. If the potential at the origin is 100 volts, find the potential at P (4, 1, 3).

    (6 marks)

Or

Turn over

12. Startinf from first principle, derive expression for the capacitance per unit length of a parallel two-wire transmission line.

13. Determine the magnetic field created by a current carrying loop. Employ this result to determine the magnetic field created by a toroid.

Or

14. (a) Explain the concept of magnetic dipole moment.   (4 marks)

    (b) A solenoid of radius 20 cm. is 50 cm. long and is wound uniformly with 500 turns of wire. When a current of 10 A flows in the coil, find the magnetic flux density and field intensity at a point on the axis distant 40 cm. from one end.

                                                                                          (8 marks)

15. (a) Derive Maxwell's equations in integral and differential forms.   (8 marks)

    (b) Explain the concept of uniform plane wave.   (4 marks)

Or

16. (a) Derive in integral form, Poynting theorem and give physical interpretation of the quantities involved.

                                                                                          (6 marks)

    (b) A plane wave is incident normally on a large sheet of copper. If the frequency and peak $\overline{E}$ of the incident wave is 100 MHz and 1 V/m. respectively, find the power absorbed per unit area by the copper sheet.

                                                                                          (6 marks)

17. (a) Explain the significance of attenuating factor of a waveguide.   (4 marks)

    (b) Derive expression for the wave impedance when TE waves are propagated between two parallel perfectly conducting planes of infinite extent in two directions.

                                                                                          (8 marks)

Or

18. (a) An air-filled hollow rectangular conducting waveguide has the cross-sectional dimensions 10 cm. × 6 cm. Find the cut-off frequency for the following modes :

    TEM, TE10, TE20, TE01.

                                                                                          (8 marks)

    (b) Explain how the modes are excited.   (4 marks)

19. (a) Explain : Phase velocity and group velocity. Derive expressions for them.   (6 marks)

    (b) A plane wave of 100 MHz travels in a lossless medium with $\mu_r = 2$ and $\epsilon_r = 2$. Find the velocity of the wave, wavelength and the intrinsic impedance of the medium.

                                                                                          (6 marks)

Or

20. A lossless transmission line is terminated in a load admittance $Y_L = 0.4 + j\,0.2$. The first stub is located at the load and second is $3\lambda/8$ away from the stub 1. Find the solutions for the length of the two stubs for both the solutions.

                                                                           [5 × 12 = 60 marks]

F 4847

Reg. No..............................

Name..................................

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Electrical and Electronics Engineering

LINEAR INTEGRATED CIRCUITS (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 4 marks.

1. What is a practical op-amp ? Draw its equivalent circuit.

2. What is meant by open-loop operation of op-amp ?

3. Draw the characteristics of an ideal comparator and that of a commercially available comparator.

4. Draw the input and output waveforms of an inverting comparator.

5. Calculate the values of the LSB, MSB and full scale output for an 8 bit DAC for the 0 to 10 V range.

6. Classify DACs on the basis of their output.

7. Draw the block diagram of phase locked loop and define pull-in-time.

8. Draw the circuit of PLL AM demodulator and explain its operation.

9. What are the modes of operation of a timer ?

10. Draw the circuit diagram of series op-amp regulator.

$(10 \times 4 = 40 \text{ marks})$

Part B

Answer all questions.
Each full question carries 12 marks.

11. Explain the operation of non-inverting and inverting amplifier.

Or

12. (a) Design an op-amp differentiator that will differentiate an input signal with f_{max} = 100 Hz.

(6 marks)

(b) Explain the operation of an op-amp integrator.

(6 marks)

Turn over

13. Explain the operation of square wave generator.

Or

14. Discuss in detail about the operation of sample and hold circuit.

15. Explain the operation of successive approximation converter.

Or

16. Explain the working of first order low pass filter.

17. Explain the operation of PLL as AM demodulator and frequency multiplier.

Or

18. Explain the operation of voltage controlled oscillator.

19. With functional internal block diagram, explain how 317 works.

Or

20. Explain the astable operation of 555 timers.

(5 × 12 = 60 marks)

F 4911   (Pages : 2)   Reg. No...............................

Name....................................

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Electrical and Electronics Engineering

EE 010 505 – LINEAR INTEGRATED CIRCUITS (EE)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. What is the difference between first order and second order filters?

2. Explain Zero crossing detector using Op-Amps.

3. Define Band pass and Band stop filters.

4. Define Capture range and Lock in range.

5. What is a VCO? Explain.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain the applications of Op-Amp as integrator and differentiator.

7. Explain the working of sample and hold circuits.

8. Explain the working of dual slope ADC.

9. List the important features of IC 723.

10. Explain the principle and working of voltage to current converter which uses a grounded load.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. Explain the block diagram of a typical Op-Amp and explain the function of each building blocks.

Or

Turn over

12. Write short notes on the following :

     (i) Differential mode gain.

     (ii) Common mode gain.

     (iii) CMRR.

     (iv) Slew rate.

(4 × 3 = 12 marks)

13. (a) Explain the principle of operation of RC phase shift oscillator.

     (b) Explain the operation of pulse width controller.

(6 + 6 = 12 marks)

Or

14. (a) Discuss about precision rectifier.

     (b) Explain 8038 function generator chip.

(6 + 6 = 12 marks)

15. (a) Design a 1st order LPF for a high cut-off frequency of 2 KHz and pass band gain of 2.

     (b) Draw and design 1st order and 2nd order HPF.

(4 + 8 = 12 marks)

Or

16. Explain with neat sketches, the working of any *two* DAC.

17. Explain any *three* applications of PLL with neat block diagram.

Or

18. Explain the functional diagram of IC 555. Explain with diagram, how it can be operated in astable operation.

19. Explain the features of LM 380 power amplifier and discuss its application as audio power amplifier.

Or

20. (a) Discuss 780 X series of voltage regulators.

     (b) Design a voltage regulator using 723 to get a voltage output of 3 V.

(8 + 4 = 12 marks)

[5 × 12 = 60 marks]

F 4816

(Pages : 2)

Reg. No.................................

Name....................................

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Electrical and Electronics Engineering

DIGITAL CIRCUITS (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 4 marks.

1. Describe two different types of negative number representations in binary arithmetics.

2. Distinguish between weighted codes and non-weighted codes, giving *one* example each.

3. Distinguish between sinking current and sourcing current of a logic family.

4. Distinguish between decoder and demultiplexer.

5. Draw circuits showing conversion of a JK flip-flop into (i) D flip-flop and (ii) T flip-flop.

6. What are the differences between synchronous inputs and asynchronous inputs in a flip-flop ?

7. Why negative edge triggered clocks are used in TTL counters ?

8. Mention the different methods to improve the counter speed.

9. How the shift register can be used for generating time delays ?

10. What is meant by bidirectional shift register ? What are its applications ?

$(10 \times 4 = 40 \text{ marks})$

Part B

Answer all questions.
Each full question carries 12 marks.

11. (a) State and prove De Morgan's theorems using truth tables.

(6 marks)

(b) What are universal logic gates ? Draw the AND, OR, NOR, EXOR gates using only NAND gates.

(6 marks)

Or

Turn over

12. Using K-map simplify the functions and draw the minimal NAND gate circuits :

    (a) $f_1 = \Sigma m \,(1, 3, 4, 5, 10, 12, 13)$.   (6 marks)

    (b) $f_2 = \overline{AB}\overline{D} + ACD + \overline{B}CD + \overline{AC}D$.   (6 marks)

13. Explain the characteristic features of CMOS logic family. With circuit diagrams, explain the working of CMOS NAND gate with two inputs.

Or

14. (a) Implement of 4 to 16 decoder using 3 to 8 decoders with enable inputs.   (6 marks)

    (b) Implement the following using 4 : 1 multiplexer $f + \Sigma \,(1, 2, 5, 6)$.   (6 marks)

15. Using NAND gates only (IC7400), draw the circuit of a Master slave JK flip-flop and explain how it eliminates race around.

Or

16. Design a mod 10 up ripple counter using JK flip-flops and explain its operation with the help of timing diagrams.

17. Design a 4-bit synchronous counter to generate an output sequence 0001, 0101, 0111, 1001, 1100 and then this sequence repeats. Draw the circuit.

Or

18. Design a modulo-10 synchronous counter to count 0, 1, 2, ... 9, 0, 1, 2, ... Draw the circuit.

19. Using JK flip-flops, design a 4-bit shift register which can perform the following operations. Parallel load, shift right, shift left.

Or

20. Draw the circuit diagrams for 3-bit :

    (i)   Ring counter.

    (ii)   Twisted ring counter and explain their working with the help of timing diagrams.

                                                  $(5 \times 12 = 60 \text{ marks})$

F 4855

Reg. No......................................

Name......................................

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Electrical and Electronics Engineering

POWER ELECTRONICS (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 4 marks.

1. Give the comparison between transistor and thyristor.

2. State the various methods of triggering of SCR. Which one is the universal method ? Why ?

3. What are the basic requirements of successful firing of thyristor ?

4. How an UJT is fired ? After firing what happens to the value of R_{B1} ? Why ?

5. What is the effect of source inductance on the performance of a three-phase fully controlled bridge converter ?

6. Explain the principle of cosine wave control of firing angle α.

7. What is pulse width modulation ? List the various PWM techniques. How do they differ from each other ?

8. Explain the need for controlling the output at the output terminals of an inverter.

9. Give the classification of chopper commutation.

10. Why a three-phase to single-phase cycloconverter requires positive and negative group phase controlled converters ?

$(10 \times 4 = 40 \text{ marks})$

Part B

Answer all questions.
Each full question carries 12 marks.

11. (a) Explain why :

    (i) the inner two layers of an SCR are lightly doped and are wide.

    (ii) the inner n layer of an SCR is doped with gold.

    (iii) I_H is less than I_L.

(6 marks)

Turn over

(b) List out the different voltage ratings of a thyristor, give their definitions and show their locations on the thyristor characteristics.   (6 marks)

Or

12. (a) Explain how a power transistor can be safeguarded against current and voltage transients. What is their effect on the safe operating area of the device ?   (6 marks)

    (b) Explain the turn-on and turn-off processes of GTO with the help of two-transistor analogy.
                                                                                                    (6 marks)

13. (a) How does the average current rating of a thyristor determined with the help of the thermal model of the device ?   (6 marks)

    (b) How does an RC triggering circuit provide a wider range of α as compared to an R triggering circuit ?   (6 marks)

Or

14. What are the different methods of triggering SCRs in series ? Draw and explain sequential firing circuit for triggering of series connected SCRs.

15. With the help of circuit diagram and waveforms, explain the operation of a three-phase, half-wave controlled converter with resistive load, and inductive load. Derive expressions for the output voltage.

Or

16. (a) Describe the continuous mode of operation of a fully controlled converter.   (4 marks)

    (b) A three-phase, half-wave converter is supplying a load with a continuous constant current of 40 A over a firing angle from 0 to 75°. What will be the power dissipated by the load at these limiting values of firing angle ? The supply voltage is 415 volt (line).   (8 marks)

17. Draw a neat diagram of parallel inverter employing feedback diodes. Explain the working with the help of voltage and current waveforms. What care should be taken to avoid commutation failure ?

Or

18. Draw a circuit of auxiliary commutated (Mc Murray inverter) single-phase bridge inverter and explain its operation by drawing voltage and current waveforms.

19. With the help of circuit diagrams and waveforms, explain the principle of working of (i) Type C and (ii) Type E chopper.

Or

20. With neat diagrams, explain the digital firing scheme for a three-phase full controlled bridge converter.

                                                                                         [5 × 12 = 60 marks]

F 4896

(Pages : 2)

Reg. No..................................

Name.....................................

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Electrical and Electronics Engineering

EE 010 504 – POWER ELECTRONICS (EE)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Draw the circuit for two transistor analogy of silicon controlled rectifier and briefly describe the working.

2. Define the terms displacement power factor, distortion factor and total harmonic distortion.

3. What is the difference between voltage and current commutation?

4. What is meant by voltage and current source inverters?

5. What are the applications of buck regulators?

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain the static and dynamic performance of IGBT.

7. Derive the expression for the output voltage of half controlled converter bridge with R load.

8. Explain the four quadrant chopper with neat figure.

9. Explain the terms under modulation and over modulation related to pulse width modulation.

10. Explain the principle of push pull converter with the aid of diagram.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each full question carries 12 marks.

11. Draw the voltage and current characteristics of a thyristor during its turn ON and turn OFF and explain.

Or

12. Explain the features of single pulse and multi pulse triggering with the aid of neat diagram.

13. Draw the circuit of single-phase fully controlled converter with RL load. Draw the output waveforms for continuous conduction and derive the equation for output voltage and current.

Or

14. Draw the circuit of three-phase full wave controlled rectifier and explain the working. Derive the expression for output voltage.

15. Describe the working of single-phase cyclo converter with the help of neat diagram.

Or

16. Draw the circuit of step up chopper and describe the principle of operation. Derive the relation for current.

17. Explain square wave mode of operation of three-phase voltage source inverter with 120° mode of operation.

Or

18. What is principle of sinusoidal pulse width modulation ? Explain about unipolar and bipolar modulation techniques with neat figures.

19. Explain the principle of operation of fly back converter with the help of neat figure.

Or

20. Draw the power circuit diagram of buck regulator and derive the voltage and current expression.

(5 × 12 = 60 marks)

F 4924

Reg. No.............................

Name.................................

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Electrical and Electronics Engineering

EE 010 506 – MICROPROCESSORS AND APPLICATIONS (EE)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. What is a microprocessor and how microcomputer is different from a microprocessor?
2. What is control bus?
3. What is the function of signal at pin marked IO/M in 8085 microprocessor?
4. What is RIM?
5. What are different operating modes of 8255?

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain what is vectored interrupts.
7. Explain the register organization of 8086.
8. Explain what is subroutine? What instruction is used to call subroutine?
9. Explain asynchronous data transfer.
10. Discuss fetch operation and execution operation of 8085.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each question carries 12 marks.

11. (i) Explain about register organization in 8085.

    (ii) Explain the addressing modes of 8085 with suitable examples.

(6 + 6 = 12 marks)

Or

12. Draw and explain the timing diagram of a three byte instruction.

Turn over

13. (i) What are various types of data formats for 8085 instructions? Give examples for each type of data format.

(ii) Write an ALP to add two 16-bit numbers the sum may be of 16-bit or more.

(6 + 6 = 12 marks)

Or

14 (i) Write an ALP to find the square from look-up table.

(ii) Write an ALP to arrange an array of data is ascending order.

(6 + 6 = 12 marks)

15. Explain about the interrupt structure of 8085.

Or

16. (i) Explain the interfacing of 8279 keyboard with neat diagram.

(ii) Explain the interfacing of 8275 CRT controller.

(6 + 6 = 12 marks)

17. Explain the interfacing of ADC with microprocessor.

Or

18. Explain I/O and memory interfacing in 8085.

19. Explain the addressing modes of 8086.

Or

20. (i) What is segmentation in 8086? What are its advantages?

(ii) Write an 8086 ALP to multiply two 16-bit numbers.

(8 + 4 = 12 marks)

[5 × 12 = 60 marks]

F 4882

(Pages : 3)

Reg. No..............................

Name..............................

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Electrical and Electronics Engineering

EE 010 503—SIGNALS AND SYSTEMS (EE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Define and sketch impulse and unit impulse signal.

2. Define Fourier transform and Inverse Fourier transform of a signal.

3. List the properties of convolution.

4. Define aliasing.

5. Define Propagation constant of a two port Network.

(5 × 3 = 15 marks)

Part B

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

6. Write the conditions of existence of Fourier series.

7. Write any *three* properties of Fourier transform.

8. Compare Power Spectral density and Energy spectral density.

9. What are the different sampling techniques ?

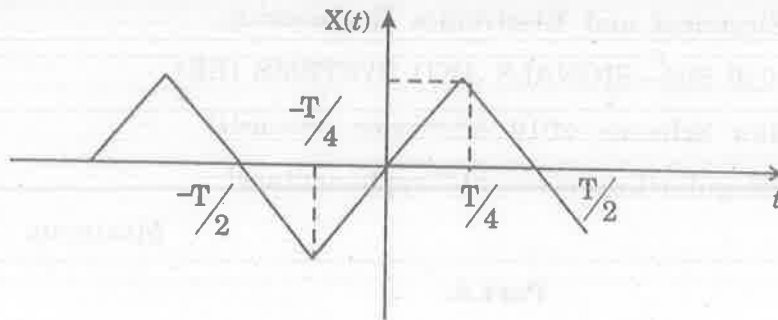10. What are the different properties of a symmetrical two port network ?
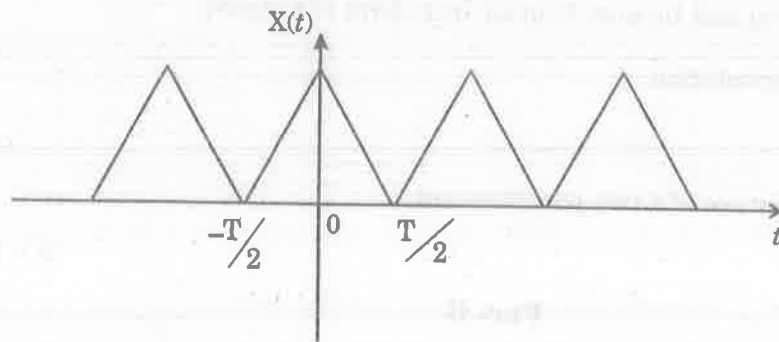
(5 × 5 = 25 marks)

Turn over

Part C

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

11. Determine the trignometric form of Fourier series of the signal shown below.
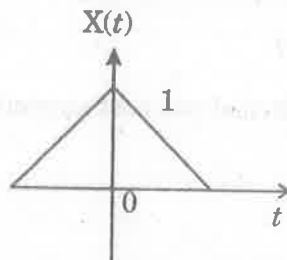

Or

12. Determine the exponential form of Fourier series of the signal shown below.

13. Find Fourier transform and draw the magnitude spectrum of the following signal : (a) Sine ; (b) Cosine ; (c) Signum function ; (d) Unit step signal.

Or

14. Determine the fourier transform of the triangular pulse.

15. Explain in detail convolution and correlation. List similarities and differences in convolution and correlation of two sequences.

Or

16. Define cross correlation and auto correlation. What are the difference between cross correlation and auto correlation ?

17. Explain in detail sampling process, reconstruction of signal and effects of under sampling.

Or

18. The transfer function of an LTJ system is $H(Z) = \dfrac{Z-1}{(Z-2)(Z+3)}$. Determine its impulse response.

19. Explain in detail M derived T and PI sections.

Or

20. Explain the behaviour of iteration impedance of low, high and Band pass falters.

$(5 \times 12 = 60 \text{ marks})$