F 3180 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Electronics 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 briefly.*
Each question carries 4 *marks.*

1. Explain the terms electric field intensity and electric potential.
2. Derive an expression to obtain the capacitance of an isolated sphere.
3. State and explain Biot-Savart's law.
4. Obtain the retarded form of scalar and vector magnetic potentials.
5. Write the expression for time average Poynting vector in terms of complex Poynting vector.
6. Write Maxwell's equations in differential form.
7. What is a wave guide ? Define cut-off frequency and cut-off wavelength of a waveguide.
8. Show that in a rectangular waveguide, the guide wavelength λ_g is smaller for a dielectric filled waveguide than for an airfilled wave guide.
9. Define and explain VSWR and reflection coefficient. Obtain the relation between these two.
10. What are the advantages of transmission lines ? What are the most common types of transmission lines ?

(10 × 4 = 40 marks)

Part B

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

11. (a) State and explain Gauss's law in differential form and explain what do you mean by $\nabla.D$.

    (b) A spherical volume of radius R has a volume charge density $\rho = Kr$, where r is the radial distance and K is a constant. Find the expression for E in the region $0 \leq r \leq \infty$.

Or

Turn over

12. Derive Laplace's equation and show that the potential field given by the equation $V = 2x^2 - 3y^2 + z^2$ satisfies the Laplace's equation.

13. (a) Derive an expression for the inductance of a toroidal coil.

(b) The magnetic vector potential is $A = \frac{5}{x^2 + y^2 + z^2} a_x$ Weber/m. Find the magnetic vector density in vector form.

Or

14. (a) Explain the concept of electromagnetic induction and Faraday's laws.

(b) A solenoid with air core has 3000 turns and a length of 60 cm. The core radius is 50 mm. Calculate its inductance.

15. Derive Maxwell's equations in integral and differential forms.

Or

16. (a) Derive wave equation. Obtain its solution for uniform plane wave.

(b) A coaxial line has an inner conductor of diameter 0.5 cm and outer conductor of diameter 2 cm. The outer conductor is grounded. The inner conductor is held at 230V and carries a current of 10 amperes. Obtain the Poynting vector.

17. Calculate the cut-off frequency and cut-off wavelength for the principal TE mode of a coaxial cable if the inner radius is 0.05 cm and the outer radius is 0.3 cm and the line is filled with a material having $\in_r = 2.38$.

Or

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

19. A 50 Ω line is terminated to a load with an unknown impedance. The standing wave ratio $s = 2.4$ on the line and a voltage maximum occurs $\lambda/8$ from the load.

(a) Determine the load impedance.

(b) How far is the first minimum voltage from the load ?

Or

20. A stub of length 0.12 λ is used to match a 60Ω lossless line to a load. It the stub is located at 0.3λ from the load, calculate

(a) the load impedance Z_L.

(b) the length of an alternative stub and its location with respect to the load.

(c) the standing wave ratio between the stub and the load.

(5 × 12 = 60 marks)

F 3209 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Electronics and Communication/Electronics and Instrumentation Engineering

MICROPROCESSORS AND MICROCONTROLLERS (LS)

(Old Scheme—Supplementary/Mercy Chance)

[Prior to 2010 Admissions]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Is it possible to multiplex the higher order address byte A15-A8 with the data byte D7–D0, like the lower order byte AD7–AD0.
2. Explain and distinguish between Fetch and Execute machine cycles.
3. Explain Port 0 and Port 1 pin circuit with a neat diagram for 8051.
4. Explain the PSW of 8051 microcontroller.
5. Explain the use of (i) T × D ; (ii) To pins of 8051.
6. Describe any four logical operations of 8051.
7. Explain different interrupt signals in 8051 and also give the priority levels for each.
8. Explain the memory organisation of Bank registers 2 bit addressable memory in 8051 internal RAM.
9. Explain single step operation in 8051 with example.
10. In which serial port mode there will be only square waves on pin T × D ? Explain why.

(10 × 4 = 40 marks)

Part B

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

11. (a) With the help of neat diagrams, show how the locations in the main memory are addressed by the processor 8085 ?

(6 marks)

Turn over

(b) With a neat timing diagram, explain the various phases during an instruction cycle related with the instruction MOV A, B. (6 marks)

Or

12. Interface one 2K × 8 EPROM and one 2K × 8 RAM chips with 8085. Select suitable map and indicate the address decoding clearly.

13. (a) Describe various registers and flags and their functions in 8051. (8 marks)

(b) Explain the program protection modes. (4 marks)

Or

14. (a) Give the details of memory mapping of internal RAM in 8051. (6 marks)

(b) Explain the idle and power down modes. (6 marks)

15. (a) Describe the SFRs of timer in 8051. (6 marks)

(b) Describe the bit level and byte level logical operation of 8051. (6 marks)

Or

16. (a) Explain, with suitable examples, the program branching and data transfer instructions. (6 marks)

(b) Explain about register banks and show how to switch it during progress in 8051. (6 marks)

17. Describe various interrupts in 8051 and explain how an interrupt is attended.

Or

18. Write 8051 program to generate a square wave 100 Hz frequency. Assume crystal frequency as 12 MHz. Use timer 0 and timer interrupt.

19. Write a 8051 program to configure the processor in Mode 0. Send the data values stored in locations 700H to 70BH through the serial port to an external serial device.

Or

20. Assuming crystal clock of 8051 to be at 12 MHz, find the values to be loaded in the timer registers tc generate a time delay of 1.5 ms. Use timer 1 in mode 1.

(5 × 12 = 60 marks)

F 3627 (Pages : 2 Reg. No. 11019079.

Name. Bibin

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 502—CONTROL SYSTEMS (EC)

(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 LTI Systems ?
2. Define Routh Hurwitz criterion ?
3. Define root locus technique ?
4. Explain Bode plot ?
5. Write state transition equation ?

(5 × 3 = 15 marks)

Part B

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

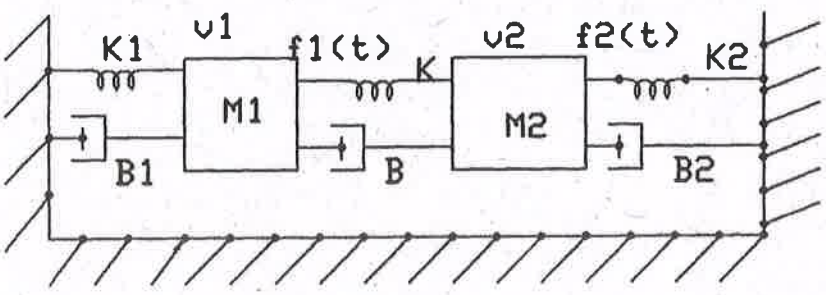
6. Explain reduction of block diagrams ?
7. Derive the relationship between characteristic equation roots and stability ?
8. Define compensator. Explain the necessity of compensators in control systems.
9. Write a short note on frequency domain specifications ?
10. Discuss about state transition matrix.

(5 × 5 = 25 marks)

Part C

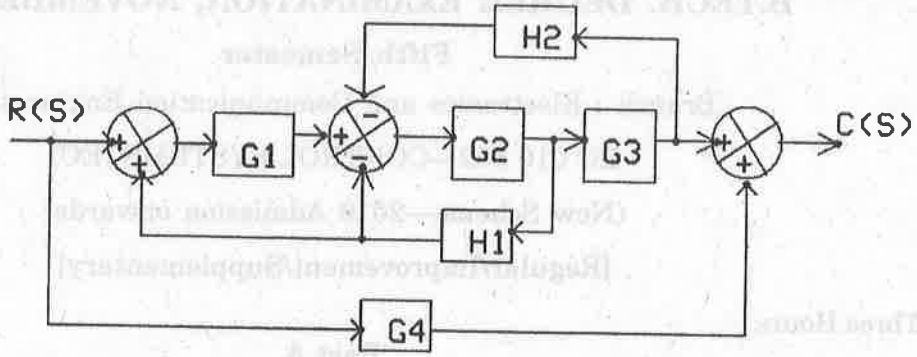
Answer **all** *questions. Each question caries 12 marks.*

11. Write the governing differential equations of the mechanical System shown in figure :



Or

12. Obtain the closed loop transfer function C(S) / R(S) of the system whose block diagram is shown in figure. Use Block diagram reduction technique and verify the transfer function with signal flow graph technique.



13. Derive unit step response and time domain specifications of first order system.

Or

14. Explain the different stability determining methods in detail.

15. Design a phase lag compensator so that the System G (*s*) H (*s*) = 100 / [*s* (*s* + 1)] will have phase margin of 15°.

Or

16. Write a short note on (i) Lead compensation ((ii) Lead compensation.

17. Discuss the effects of adding zeroes and poles to the forward path transfer function.

Or

18. Explain Nichols plot in detail.

19. Determine the Eigen values and state transition matrix for the following System :

$$A = \begin{bmatrix} 0 & 1 \\ -4 & -5 \end{bmatrix}; B = \begin{bmatrix} 1 \\ 1 \end{bmatrix}; C = [0, 1]; D = [0].$$

Or

20. Explain the state variable analysis of control Systems.

(5 × 12 = 60 marks)

F 3636 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 503—DIGITAL SYSTEM DESIGN (EC)

(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 operators. List out the different types of operators.
2. Differentiate ROM and PLA ?
3. Define FSM ? Draw the block diagram of FSM.
4. List out the ASM chart components.
5. Define linear feedback shift register.

(5 × 3 = 15 marks)

Part B

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

6. Implement de–multiplexer using verilog.
7. Describe the typical ROM internal origination with neat diagram.
8. Explain Meta stability.
9. Write a short note on algorithmic state machine.
10. Write a Verilog code for up/down counter.

(5 × 5 = 25 marks)

Part C

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

11. Write a short note on :
    (i) Signal drivers.
    (ii) Data types.
    (iii) Language elements.

Or

12. Design an encoder using two half adders by writing Verilog program.

13. Design using PLA the following Boolean functions.

    (i) $X(A, B, C) = \Sigma(0, 1, 2, 4)$

    (ii) $Y(A, B, C) = \Sigma(0, 5, 6, 7)$.

Or

14. Explain Quine–McCluskey algorithm in detail.

15. Design a sequence detector which detects the sequence "01110" using D flip–flops.

Or

16. Design a serial binary adder using delay flip–flops.

17. Design a sequence detector that produces an output 1 whenever the sequence 101101 is detected using ASM chart.

Or

18. Explain state assignments in detail.

19. What is barrel shifter ? Explain its principle. Using Verilog HDL, Model a 4–bit parallel shifter.

Or

20. Write a note on :

    (i) FSM.

    (ii) Linear feedback shift register.

(5 × 12 = 60 marks)

F 3647 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 504—ELECTRICAL DRIVES AND CONTROL (EC)

(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 meant by critical resistance of DC Generator ?
2. Why does a single–phase induction motor require capacitor ?
3. List the different protection schemes required for SCR.
4. What is meant by four quadrant chopper ?
5. What is the need for V/f control in induction motor drives ?

(5 × 3 = 15 marks)

Part B

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

6. An eight pole dc generator has a simple wave wound armature containing 32 coils of 6 turns each. Its flux per pole is 0.06 Wb. The machine is running at 250 r.p.m. Compute the induced armature voltage.
7. Determine the power delivered by a 440 V, 3–phase, 10 pole and 50 Hz synchronous motor delivering a torque of $\frac{50}{\pi}$ Nm .
8. Draw and explain any one of the triggering circuit of SCR.
9. A single phase full converter feeds power to RLE load with R = 10 Ω, L = 10 mH and E = 50 V in continuous conduction mode. The AC source voltage is 230 V 50 Hz. What is the average value of load current for firing angle delay of 60^0 ?
10. Write short notes on chopper fed drives.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. (a) Explain the load characteristics of DC shunt generator. (6 marks)

(b) Discuss the different losses in shunt generator. (6 marks)

Or

12. (a) Explain the speed–torque characteristics of a DC shunt motor with respect to any one of its application. (8 marks)

(b) Explain the importance of Swinburne's test. (4 marks)

13. (a) Draw the equivalent circuit of a transformer and give the procedure to obtain the values of all the parameters for a given single phase transformer. (8 marks)

(b) Derive the e.m.f. equation of an alternator. (4 marks)

Or

14. (a) Draw the torque-slip characteristics of a three-phase induction motor and explain its stable and unstable portions. What is meant by pull out torque ? (8 marks)

(b) What happens to the power drawn by an induction motor if its rotor is externally driven to synchronous speed ? (4 marks)

15. (a) Narrate the constructional features of SCR with neat sketch. (6 marks)

(b) What is power diode and where are they used ? (6 marks)

Or

16. (a) Narrate the constructional features of TRIAC with neat sketch. (6 marks)

(b) How can be obtain the functionality of TRIAC using SCRs. (6 marks)

17. Explain the principle of operation and application of UPS with neat block schematic.

Or

18. Explain the step down and step up chopper with neat circuit diagrams and mathematical expression for output voltage.

19. Explain different methods of speed control of DC motors.

Or

20. Explain the principle of rotor side control of the speed of three phase induction motor and its applications.

(5 × 12 = 60 marks)

F 3659 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 505 – APPLIED ELECTROMAGNETIC THEORY (EC)

(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. State and explain Lorentz Gauge condition in detail.
2. Define and explain the types of Polarization.
3. What are dominant and degenerate modes? Explain.
4. Which mode offers wide tuning range in a circular cavity resonator? Why? Explain in detail.
5. Derive the input impedance of a $\lambda/2$ transmission line. Assume the line is lossless.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Derive the capacitance of a co-axial line. Explain the steps.
7. Derive Maxwell's equations in integral form.
8. Prove that TM_{01} does not exist in a rectangular waveguide. Justify your answer.
9. Define and explain the Q factor of a cavity resonator.
10. Explain the concept of impedance matching in Single stub tuner with a diagram.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. (i) State and derive Gauss divergence theorem.

    (ii) Derive the inductance of flat line. Explain the differences between co-axial line and two wire transmission line.

Or

Turn over

12. (i) Derive the equation of continuity.

(ii) Derive the energy stored in electric field.

(iii) State and derive Stoke's theorem.

13. (i) State Poynting theorem. Derive the equation of complex vector. Explain its applications.

(ii) Explain the characteristics of uniform plane waves.

Or

14. (i) Explain the reflection and refraction of plane waves by conductor and dielectric.

(ii) Define and explain Skin depth. Explain its significance. Derive an expression for skin depth.

15. (i) Explain the characteristics of TM waves. Derive their characteristic equations.

(ii) Discuss the excitation of modes in rectangular waveguides with neat diagrams.

Or

16. (i) Defie and explain : (a) Cutoff frequency ; (b) Wave impedance ; (c) Surface resistance ; and (d) Characteristic impedance.

(ii) When a wave of 6 GHz propagates in parallel conducting plates separated by 3 cm, find the v_p and v_g of the wave for the dominant wave.

17. (i) Explain the significance of Bessel functions in circular waveguide analysis, with an example.

(ii) Mathematically prove that the dominant mode for circular waveguide is TE_{11}.

Or

18. (i) Design a rectangular cavity to have a resonant frequency of 9.8 GHz, having dimensions $a = d$ and $b = a/2$.

(ii) The resonant frequency of a cavity is 8.8 GHz. It is critically coupled to an external circuit. The measured bandwidth with loading is 4 GHz. Calculate the loaded and unloaded Q's.

19. (i) Derive standard Smith chart equations. Explain the applications of Smith chart with examples.

(ii) Derive standard transmission line equations.

Or

20. (i) Define and explain : (a) Characteristic impedance ; (b) Transfer impedance ; (c) Propagation constant ; and (d) Reflection coefficient.

(ii) Derive the input impedance of a lossless line. For a shorted section of 75 ohm transmission line, $1 = \lambda/4$, find the input impedance assuming $\alpha = 0$.

(5 × 12 = 60 marks)

F 3669 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 506 – MICROPROCESSORS AND APPLICATIONS (EC)

(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 microprocessor and microcomputer? Explain.
2. What is tri state logic? Explain with its diagram.
3. Differentiate DAC from ADC.
4. Explain the basic concepts of programmable interfacing devices.
5. Explain the minimum and maximum mode operations of intel 8086 microprocessor.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Discuss the functions of microprocessors in detail.
7. Write an ALP to find largest number in a given data array. Explain the steps.
8. What are SIM and RIM instructions? Explain.
9. Draw the 8237 DMA controller and explain it in detail.
10. Explain the advantages and disadvantages of physical memory in detail.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. (i) Explain the organization of a microprocessor based system with a neat diagram.

    (ii) Explain the significance and types of flags in detail.

Or

Turn over

12. (i) Explain the pin configurations and functions of 8085, with a diagram in detail.

(ii) Explain the terms T state, Machine cycle and instruction cycle with respect to execution of instructions.

13. (i) Explain stack and subroutine with examples.

(ii) Write an ALP to multiply two 8-bit numbers stores at 2000H and 2001H and display the result in the address field of the microprocessor kit.

Or

14. (i) Write an ALP to arrange numbers in a data array in descending orders.

(ii) Explain the basic concepts in 8085 serial I/O lines.

15. (i) Explain the steps to interface input and output devices.

(ii) Give an account on "Vectored interrupts".

Or

16. (i) Explain the interfacing of 8279 key board with a neat diagram.

(ii) Draw the block diagram of 8259A and explain it detail.

17. Explain the block diagram of DMA controller in detail.

Or

18. (i) Explain the following in detail :

(a) PPI.

(b) Restart as software instruction.

(ii) Give an account on "memory mapped I/O and I/O mapped I/O schemes".

19. (i) Explain the internal architecture of intel 8086 in detail.

(ii) Explain the interrupt applications of intel 8086 with examples.

Or

20. (i) Explain the addressing modes of intel 8086 in detail.

(ii) Explain the memory organization in intel 8086.

(5 × 12 = 60 marks)

20. Find the initial basic feasible solution of the following transportation problem by Vogel's approximation method (VAM). Here, F_1, F_2 and F_3 are factories, and W_1, W_2 and W_3 are warehouses.

	W_1	W_2	W_3	W_4	*Production of Factories*
F_1	21	16	25	13	11
F_2	17	18	14	23	13
F_3	32	27	18	41	19
Capacity of the warehouse	6	10	12	15	43

(5 × 12 = 60 marks)

F 3621 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Common to all Branches except C.S. and I.T.

EN 010 501-A—ENGINEERING MATHEMATICS—IV

(Regular/Improvement/Supplementary)

[New Scheme—2010 Admission onwards]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. An electrostatic field in the xy-plane is given by the potential function $\phi = 3x^2y - y^3$, find the stream function.
2. Find the image of the circle $|z-1|=1$ in the complex plane under the mapping $w=\frac{1}{z}$.
3. Find the real root of the equation $x^2 - 2x - 5 = 0$ by the method of false position correct to 3 decimal places.
4. Solve $\frac{dy}{dx} = 1 - y$, $y(0) = 0$ in the range $0 \le x \le 3$ by taking $h = 0.1$ by the modified Euler's method.
5. Construct the dual of the L.P.P.

   Maximize $z = 4x_1 + 9x_2 + 2x_3$

   subject to $2x_1 + 3x_2 + 2x_3 \le 7$, $3x_1 - 2x_2 + 4x_3 = 5$; $x_1, x_2, x_3 \ge 0$.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Show that $\sqrt{|xy|}$ is not analytic at the origin, although Cauchy-Riemann equations are satisfied at the point.
7. Find the Taylor's series expansion of $f(z) = \frac{2z^3+1}{z^2+z}$ about $z = i$.

Turn over

8. Find by the iteration method, a real root of $2x - \log_{10} x = 7$.

9. Solve $\frac{dy}{dx} = x + z, \frac{dz}{dx} = x - y^2$ with $y(0) = 2$, $z(0) = 1$ to get $y(0.1)$, $y(0.2)$, $z(0.1)$ and $z(0.2)$ approximately by Taylor's series.

10. Using graphical method, solve the following L.P.P.

Maximize $z = 2x_1 + 3x_2$

subject to $x_1 - x_2 \leq 2$

$x_1 + x_2 \geq 4$,

$x_1, x_2 \geq 0$.

(5 × 5 = 25 marks)

Part C

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

11. (a) Determine the analytic function $f(z) = u + iv$ if $u - v = \frac{\cos x + \sin x - e^{-y}}{2(\cos x - \cosh y)}$ and $f(\pi/2) = 0$.

(6 marks)

(b) Find the bilinear transformation which maps the points $z = 1, i, -1$ into the points $w = i, 0, -i$. Hence find the image of $|z| < 1$.

(6 marks)

Or

12. (a) Prove that the function $f(z)$ defined by $f(z) = \frac{x^3(1+i) - y^3 1 - i}{x^2 + y^2}$, $z \neq 0$ and $f(0) = 0$ is continuous and the Cauchy-Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist.

(6 marks)

(b) Show that the transformation $w = \frac{3 - z}{z - 2}$ transforms the circle with center $\left(\frac{5}{2}, 0\right)$ and radius $\frac{1}{2}$ in the z-plane into the imaginary axis in the w-plane and the interior of the circle into the right half of the plane.

(6 marks)

13. (a) Evaluate $\int_C \frac{z-3}{z^2+2z+5} dz$, where C is the circle (i) $|z| = 1$; (ii) $|z + 1 - i| = 2$; (iii) $|z + 1 + i| = 2$.

(8 marks)

(b) Determine the poles of the function $f(z) = \frac{x^2}{(z-1)^2 (z+2)}$ and the residue at each pole.

(4 marks)

Or

14. (a) Find the Laurent's expansion of $f(z) = \frac{7z - 2}{(z+1)z(z-2)}$ in the region $1 < |z+1| < 3$. (5 marks)

(b) Show the method of residues, that $\int_0^{\pi} \frac{a}{a^2 + \sin^2 \theta} d\theta = \frac{\pi}{\sqrt{1+a^2}}$. (7 marks)

15. (a) Using Newton's iterative method, find the real root of $x \log_{10} x = 1.2$ correct to five decimal places.

(6 marks)

(b) Solve by Gauss-Seidel method :

$10x + 2y + z = 9$

$2x + 20y - 2z = -44$

$-2x + 3y + 10z = 22$.

(6 marks)

Or

16. (a) Find a real root of the equation $x^3 - x - 11 = 0$, correct to 4 decimal places using the bisection method.

(6 marks)

(b) Find the root of the equation $\cos x - xe^x = 0$ by secant method correct to four decimal places.

(6 marks)

17. Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx} = yz + x$, $\frac{dz}{dx} = xz + y$ given that $y(0) = 1$, $z(0) = -1$ for $y(0.2)$, $z(0.2)$.

Or

18. Apply Milne's method, to find a solution of the differential equation $y' = x - y^2$ in the range $0 \leq x \leq 1$ for the boundary condition $y = 0$ at $x = 0$.

19. (a) What is the maximization transport problem ? How do you solve it ? (3 marks)

(b) Using simplex method solve the LPP

Maximize $z = 5x_1 + 3x_2$

subject to $x_1 + x_2 \leq 2$

$5x_1 + 2x_2 \leq 10$

$3x_1 + 8x_2 \leq 12$,

$x_1, x_2 \geq 0$.

(9 marks)

Or

F 3170 (Pages : 3) Reg. No. 18.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Electronics and Communication Engineering

POWER ELECTRONICS (LA)

(Old Scheme—Supplementary/Mercy Chance)

[Prior to 2010 Admissions]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define latching current, holding current and turn-on time with respect to an SCR.
2. Discuss the merits and demerits of a GTO as compared to a conventional SCR.
3. Justify the statement, "Free wheeling diode improves the power factor of the system".
4. With neat circuit diagram and waveforms explain the working of single phase half wave controlled rectifier with RL load.
5. Draw the circuit diagram and waveforms of a bidirectional AC voltage controller which uses single SCR and diodes. Comment on its efficiency.
6. What is a cycloconverter ? What are its limitations ?
7. What is commutation ? Explain two types of commutation.
8. Explain the working of a two-quadrant type-A chopper.
9. What is the PWM technique used in invertors ?
10. Write any four differences between Current source inverter and Voltage source inverter.

(10 × 4 = 40 marks)

Part B

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

11. (a) Explain the $\frac{di}{dt}$ and $\frac{dv}{dt}$ protection of thyristors. (6 marks)

    (b) Draw and explain the switching characteristics of power BJT. (6 marks)

Or

Turn over

12. (a) Draw and explain the characteristics of SCR and explain various parameters in it. (6 marks)

(b) What is an IGBT ? With a neat constructional diagram, explain its principle of working. (6 marks)

13. With relevant waveforms explain the operation of a single-phase half wave controlled rectifier with R load. Hence determine V_{dc} and I_{dc} expressions.

Or

14. With circuit diagram and waveforms explain the operation of a fully controlled converter.

15. Explain the operation of a cycloconverter with suitable circuit diagram and waveforms. Discuss its applications.

Or

16. (a) With a neat circuit diagram and waveforms, explain the working principle of single-phase fullwave AC voltage controller with resistive load. (6 marks)

(b) A single-phase full wave AC voltage controller has a resistive load of 10 Ω and input voltage is 120 V rms, 50 Hz. The delay angles of both the thyristors are $\frac{\pi}{2}$. Calculate :

(i) rms output voltage.

(ii) the input power.

(iii) rms value of current of thyristors. (6 marks)

17. (a) With necessary waveforms explain the working of auxiliary commutation scheme. (6 marks)

(b) A chopper circuit drives an induction load from 200 V DC supply. If the load resistance is 4Ω, with average load current 30 A and operating frequency is 400 Hz, compute the ON period and OFF period of the chopper. Also determine the duty cycle of the chopper. (6 marks)

Or

18. (a) With neat circuit diagram and waveforms explain the principle of step-up chopper.

(b) A step-down DC chopper has a resistive load of R = 15 Ω and input voltage 120 V. When the chopper remains ON, its voltage drop is 2.5 V. The chopper frequency is 1 kHz. If the duty cycle is 50 %, determine :

(i) Average output voltage ;

(ii) Chopper efficiency ; and

(iii) Effective input resistance of chopper.

19. (a) Explain the various harmonic reduction techniques in inverters. (5 marks)

(b) With the help of neat circuit and waveforms, explain a parallel inverter circuit. (7 marks)

Or

20. (a) With appropriate circuit and waveforms, describe the working of a single-phase series inverter. (6 marks)

(b) Briefly explain three-phase voltage source inverter with suitable circuit diagram. (6 marks)

[5 × 12 = 60 marks]

F 3164 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Common to all Branches except C.S. and I.T.

ENGINEERING MATHEMATICS – IV (CMELPASUF)

(Old Scheme—Supplementary/Mercy Chance)

[Prior to 2010 admissions]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Each full question carries 20 *marks.*

1. (a) Using Cauchy's integral formula, evaluate $\int_C \frac{z+1}{z^2+2z+5}dz$ where C is the circle $|z+1-i|=2$, integration being taken in the counter clockwise direction.

(b) Expand $\frac{1}{z(z-1)(z-2)}$ in Laurent's series for $|z|>2$.

Or

2. (a) Evaluate $\oint_C \frac{z}{z(z-1)(z-2)^2}dz$, where C is the circle $|z-2|=\frac{1}{2}$.

(b) Evaluate by contour integration $\int_0^\infty \frac{x^2dx}{(x^2+9)(x^2+4)^2}$.

3. (a) Find a root of the equation $x^6-x^4-x^3=1$ correct to three decimal places using Regula Falsi method.

(b) Solve by Gauss-Jacobi's method :

$$54x+y+z=110$$
$$2x+15y+6z=72$$
$$-x+6y+27z=85.$$

Or

Turn over

4. (a) Find a root of $x^3 - 4x - 9 = 0$ correct to three decimal places using Bisection method.

   (b) Solve by Gauss-Seidel method :

$$10x_1 - 5x_2 - 2x_3 = 3$$
$$4x_1 - 10x_2 + 3x_3 = -3$$
$$x_1 + 6x_2 + 10x_3 = -3.$$

5. (a) Using Taylor's series method solve $\frac{dy}{dx} = x^2 - y, y(0) = 1$ at $x = 0.1, 0.2, 0.3$ and 0.4.

   (b) Use Runge-Kutta method to solve $\frac{dy}{dx} = x^2 - y^2, y(1) = 1.5$ at $x = 1.2$ in steps of 0.1.

Or

6. (a) Taking $h = 0.05$ and applying modified Euler's method, solve the initial value problem $y' = x^2 + y, y(0) = 1$, obtain $y(0.1)$.

   (b) Using Milne's predictor-corrector method solve the initial value problem $\frac{2dy}{dx} = (1 + x^2)y^2, y(0) = 1$ and obtain y (0.4). Use the solution values :

$$y(0.1) = 1.06, y(0.2) = 1.12, y(0.3) = 1.21.$$

7. (a) Given $Z(u_n) = \frac{2z^2 + 3z + 4}{(z-3)^3}, |z| > 3$, show that $u_1 = 2, u_2 = 21, u_3 = 139$.

   (b) Solve $x_{n+1} - y_n = 1, y_{n+1} - x_n = 0, x_0 = 0, y_0 = -1$.

Or

8. (a) Find the z-transform of :

   (i) $e^{4t} \sin 3t$.

   (ii) $(t + T)e^{-(t+T)}$.

   (iii) $4^n + \left(\frac{1}{2}\right)^n + u(n-3)$.

   (b) Find the inverse z-transform of $\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$.

9. (a) Solve the following L.P.P. by simplex method :

Maximize $Z = x_1 + 2x_2 + 3x_3 - x_4$

subject to
$$x_1 + 2x_2 + 3x_3 = 15$$
$$2x_1 + x_2 + 5x_3 = 20$$
$$x_1 + 2x_2 + x_3 + x_4 = 10.$$

   (b) Solve the following transportation problem :

		Destination				Avail
		D_1	D_2	D_3	D_4	
Origin	O_1	5	3	6	2	19
	O_2	4	7	9	1	37
	O_3	3	4	7	5	34
Require		16	18	31	25	

Or

10. (a) Using the duality theory, solve the L.P.P. :

Minimize $Z = 3x_1 - 2x_2 + 4x_3$

subject to
$$3x_1 + 5x_2 + 4x_3 \geq 7$$
$$6x_1 + x_2 + 3x_3 \geq 4$$
$$7x_1 - 2x_2 - x_3 \leq 10$$
$$x_1, x_2, x_3 \geq 0.$$

   (b) Apply Vogel's method to find the transportation cost to the following transportation model :

	1	2	3	4	
1	10	2	20	11	15
2	12	7	9	20	25
3	4	14	16	18	10
	5	15	15	15	

(5 × 20 = 100 marks)