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18EE32

Third Semester B.E. Degree Examination, July/August 2022

Electric Circuit Analysis

Time: 3 hrs.

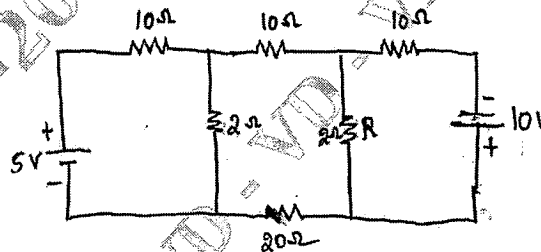
Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

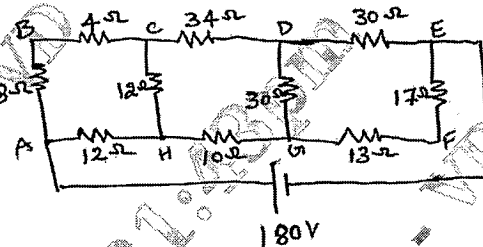
- 1 a. Find the Voltage across resistance R in the network Fig. Q1(a) by Mesh analysis. (08 Marks)

Fig. Q1(a)



- b. Find the current in the 10Ω resistor in the given network shown in Fig. Q1(b) by using Star - delta transformation. (06 Marks)

Fig. Q1(b)

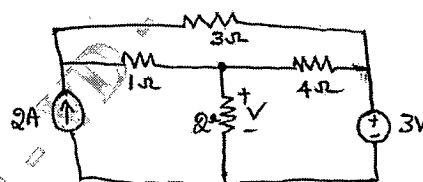


- c. Distinguish between : i) Active and Passive Elements ii) Ideal and Practical sources
iii) Lumped and distributed network. (06 Marks)

OR

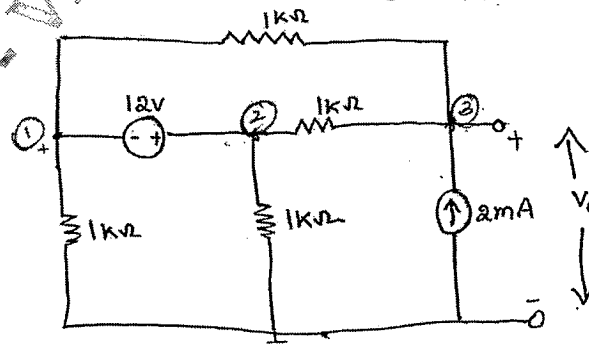
- 2 a. Use source shifting and transformation techniques to find voltage across 2Ω resistor show in Fig. Q2(a). (08 Marks)

Fig. Q2(a)



- b. Use the nodal analysis to find V_o in the network shown in Fig. Q2(b). (06 Marks)

Fig. Q2(b)



Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

- c. Determine the current I_o in the circuit of Fig. Q2(c) using Mesh analysis. (06 Marks)

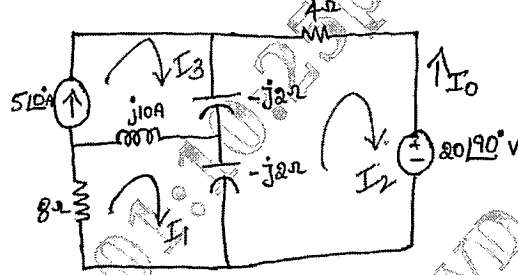
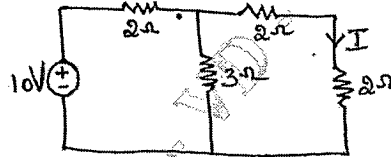


Fig. Q2(c)

Module-2

- 3 a. State and explain Super Position theorem with example. (08 Marks)
 b. Verify the Reciprocity theorem for current I in the network given in Fig. Q3(b). (06 Marks)

Fig. Q3(b)

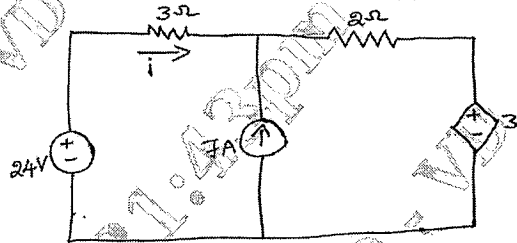


- c. State and explain Thevenin's theorem. (06 Marks)

OR

- 4 a. Find the current i using Super Position theorem for the Fig. Q4(a). (10 Marks)

Fig. Q4(a)



- b. State and prove Millman's theorem. (10 Marks)

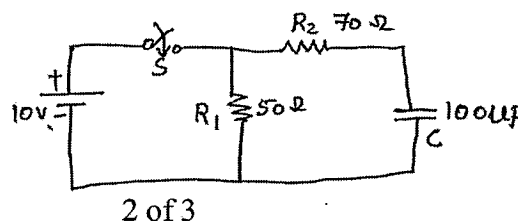
Module-3

- 5 a. Derive the expression for resonant frequency and quality factor (Q_s). Write expression for W_1 and W_2 and show that $\sqrt{W_1 * W_2} = W_0$. (08 Marks)
 b. An RLC series circuit has resistance of 10Ω a capacitance of $100\mu f$ and a variable inductance.
 i) Find the value of inductance for which, the voltage across resistance is maximum
 ii) Q factor.
 iii) Voltage drops across R , L and C . The applied voltage is $230V$, $50Hz$. (08 Marks)
 c. What are initial conditions and their use in Network Analysis? (04 Marks)

OR

- 6 a. What is Resonance? Derive expression for cut – off frequencies. (10 Marks)
 b. In the Fig. Q6(b), the switch S is closed at $t = 0$, find the time when the current from the battery reaches to $500mA$. (10 Marks)

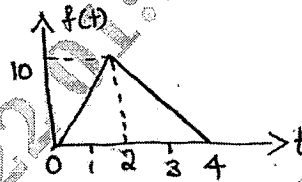
Fig. Q6(b)



Module-4

- 7 a. State and prove initial value theorem and Final Value theorem. (08 Marks)
 b. Obtain the Laplace transform of :
 i) Unit step functions $f(t) = u(t)$ ii) $f(t) = \sin wt$ iii) $f(t) = \sin h wt$. (06 Marks)
 c. Obtain the Laplace transform of the function shown in Fig. Q7(c). (06 Marks)

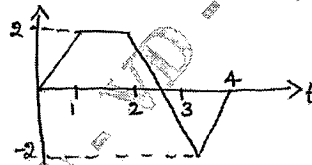
Fig. Q7(c)



OR

- 8 a. Find the Laplace transform of i) $f(t) = te^{-3t} u(t)$ ii) $5 + 4e^{-2t}$ iii) $e^{-at} \sin wt$ (10 Marks)
 iv) $t \cos at$. (10 Marks)
 b. Find the Laplace transform for the waveform shown in Fig. Q8(b). (10 Marks)

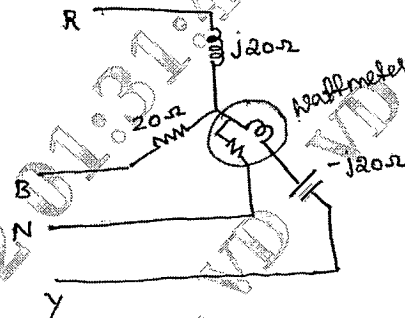
Fig. Q8(b)



Module-5

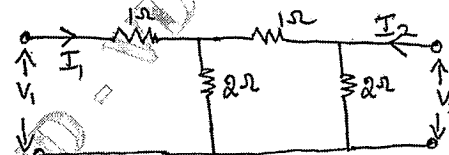
- 9 a. Find the reading on the Wattmeter in Fig. Q9(a). When the circuit is connected to a 400V , 3 - ϕ supply. The phase sequence is RYB. Neglect Wattmeter losses. (10 Marks)

Fig. Q9(a)



- b. Find Z parameters of the network shown in Fig. Q9(b). (10 Marks)

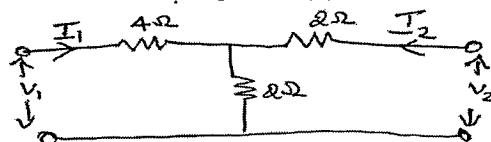
Fig. Q9(b)



OR

- 10 a. Define Y and Z parameters. Derive relation between Z and Y parameters. (10 Marks)
 b. Find Y parameters for the network shown in Fig. Q10(b). (10 Marks)

Fig. Q10(b)



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18EE34

Third Semester B.E. Degree Examination, July/August 2022 Analog Electronic Circuits

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- Draw a double ended clipper circuit and explain the working principle with transfer characteristics. (08 Marks)
 - Explain the operation of transistor as a switch with suitable circuit and necessary waveforms. (05 Marks)
 - For the voltage divider bias circuit, $V_{CC} = 16V$, $V_{BE} = 0.7V$, $\beta = 80$, $R_1 = 62K\Omega$, $R_2 = 9.1K\Omega$, $R_C = 3.9K\Omega$, $R_E = 680\Omega$. Calculate quiescent base, collector currents and collector to emitter voltage. (07 Marks)

OR

- Derive an expression for $S_{I_{CO}}$ and $S_{V_{BE}}$ of emitter bias stabilization circuit. (08 Marks)
 - Draw and explain the working of clamper circuit which clamps negative peak of a single to zero. (06 Marks)
 - For the fixed bias configuration shown in Fig.Q2(c), determine I_{BQ} , I_{CQ} , V_{CEQ} and saturation level for the network. Given $V_{BE} = 0.7V$, $\beta = 50$. (06 Marks)

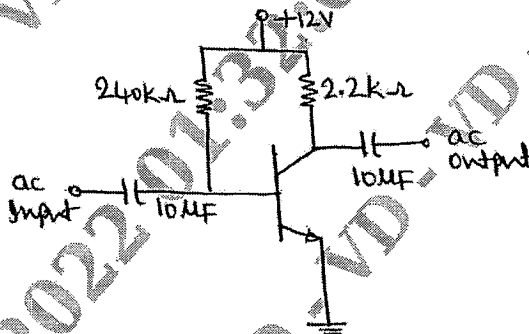


Fig.Q2(c)

Module-2

- Compare the characteristics of CB, CE and CC configuration of transistor. (04 Marks)
 - Derive an expression for Z_i and Z_o for emitter follower configuration using approximate hybrid model. (08 Marks)
 - A CE amplifier uses $R_L = R_S = 1K\Omega$. The h-parameters are $h_{ie} = 1.1K\Omega$, $h_{re} = 2.5 \times 10^{-4}$, $h_{fe} = 50$, $h_{oe} = 25\mu A/v$. Find voltage gain, current gain, input impedance and output admittance. (08 Marks)

OR

- Starting from the fundamentals, define h-parameters and obtain h-parameter equivalent circuit of common emitter configuration. (08 Marks)
 - State and prove Miller's theorem with its dual. (08 Marks)
 - The h-parameters for the transistor are $h_{ie} = 1.1K\Omega$, $h_{fe} = 99$, $h_{re} = 2.5 \times 10^{-4}$ and $h_{oe} = 25\mu A/v$, find h-parameters for common base configuration. (04 Marks)

Module-3

- 5 a. Obtain expression for input impedance, current gain and voltage gain of a Darlington emitter follower circuit with hybrid parameter equivalent circuit. (10 Marks)
b. With a simple block diagram, explain the concept of feedback amplifier. (06 Marks)
c. The overall gain of a multistage amplifier is 100. When negative feedback is applied the gain reduces to 10. Find the fraction of the output that is feedback to the input. (04 Marks)

OR

- 6 a. With the help of circuit diagram discuss the importance of cascade connection of transistors. (06 Marks)
b. Mention the advantages of negative feedback amplifier. (04 Marks)
c. Using the block diagram approach, derive an expression for A_f and Z_{if} for voltage series feedback amplifier. (10 Marks)

Module-4

- 7 a. With circuit diagram, explain the operation of Wein bridge oscillator. Also derive its frequency of oscillation. (08 Marks)
b. With the help of circuit diagram, explain the working of Hartley oscillator. (06 Marks)
c. Calculate the power dissipated in the individual transistor of a class B push-pull power amplifier if $V_{CC} = 18V$ and $R_L = 4\Omega$. (06 Marks)

OR

- 8 a. Explain the operation of series fed, directly coupled class A power amplifier. Derive its efficiency in terms of rms values. (10 Marks)
b. State the advantage of push pull operation. (04 Marks)
c. A crystal has these values $L = 3H$, $C_s = 0.5pF$, $R = 5K\Omega$ and $C_m = 10pF$. Calculate f_s and f_p of the crystal. (06 Marks)

Module-5

- 9 a. Explain the construction, operation and characteristics of n-channel JFET. (12 Marks)
b. Discuss the differences between FET and BJT. (04 Marks)
c. A JFET has $g_m = 5mV$ at $V_{GS} = 1V$. Find I_{DSS} if pinch-off voltage $V_p = -2V$. (04 Marks)

OR

- 10 a. With neat sketches, explain the construction operations and characteristics of n-channel depletion type MOSFET. (12 Marks)
b. Draw the JFET amplifier using fixed bias configuration. Derive Z_i , Z_o and A_v using small model. (08 Marks)

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18EE35

Third Semester B.E. Degree Examination, July/August 2022 Digital System Design

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the definition of combinational logic. Convert the given Boolean expression into minterm canonical form and maxterm canonical form $F(x, y, z) = X + \overline{XZ}(y + z)$. (08 Marks)
- b. Simplify the function : $y = f(a, b, c, d) = \Sigma m(2, 3, 4, 5, 13, 15) + \Sigma d(8, 9, 10, 11)$ using Karnaugh map. (06 Marks)
- c. Simplify the function : $y = f(a, b, c, d) = \pi M(0, 4, 5, 7, 8, 9, 11, 12, 13, 15)$ using the Karnaugh map. (06 Marks)

OR

- 2 a. Simplify using the Quine – Mc-Clusky minimization technique.
 $y = f(a, b, c, d) = \Sigma m(0, 2, 8, 10)$. (08 Marks)
- b. Using the Quine – McCluskey method obtain all the prime implicants for the following Boolean function : $f(a, b, c, d) = \pi M(0, 2, 3, 4, 5, 12, 13) + dc(8, 10)$. (12 Marks)

Module-2

- 3 a. With the aid of general structure, clearly distinguish between a decoder and encoder. (06 Marks)
- b. Implement the following Boolean function using 4 : 1 multiplexer.
 $F(A, B, C) = \Sigma m(1, 3, 4, 6)$. (06 Marks)
- c. Implement full subtractor using a decoder and two NAND gates and write its truth table. (08 Marks)

OR

- 4 a. What is carry look ahead adder? Explain general organization of it. (06 Marks)
- b. Write a truth table for two bit magnitude comparator. Write the Karnaugh map for each output of two bit magnitude comparator and the resulting equation. (14 Marks)

Module-3

- 5 a. What is a Flip-Flop? Discuss the working principle of SR Flip-Flop with its truth table. Also highlight the role of SR Flip-Flop in switch de-bouncer circuit. (12 Marks)
- b. Explain the operation of master slave JK Flip-Flop along with its circuit diagram. (08 Marks)

OR

- 6 a. Draw and explain the working of Positive and Negative edge triggered D flip-flop. (12 Marks)
- b. Derive the characteristic equations for D, JK, T and SR Flip-Flops. (08 Marks)

Module-4

- 7 a. Explain with suitable logic and timing diagram.
 i) Serial-in serial out shift register
 ii) Parallel-in parallel out shift register. (10 Marks)
- b. Compare Registers and Counters. Explain the working of 4-bit asynchronous counter configured using JK flip-flops. (10 Marks)

OR

- 8 a. Describe the block diagram of a MOD-7 Johnson counter and explain its operation. Give the count sequence table and the decoding logic used to identify the various states. (10 Marks)
- b. Design a MOD-5 synchronous binary counter using clocked JK Flip-Flops. (10 Marks)

Module-5

- 9 a. With a suitable example, explain Mealy and Moore model in a sequential circuit analysis. (08 Marks)
- b. A sequential circuit has one input and one output. The state diagram is as shown in Fig.Q9(b). Design a sequential circuit with 'T' flip-flop.

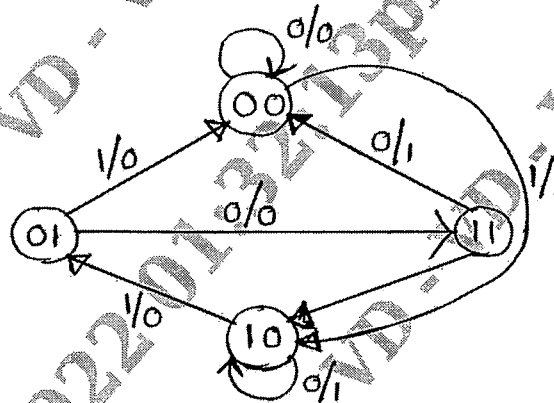


Fig.Q9(b)

(12 Marks)

OR

- 10 a. With a basic structure, explain clearly Programmable Read Only Memories (PROMS) and EPROM. (13 Marks)
- b. Write short notes on :
 i) Read only and Read/Write memories
 ii) Flash memory. (07 Marks)

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18EE36

Third Semester B.E. Degree Examination, July/August 2022 Electrical and Electronic Measurements

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define sensitivity of galvanometer. Draw Wheatstone's bridge and derive balance equation. (08 Marks)
- b. A Wheatstone Bridge has $P = 1K\Omega$, $Q = 100\Omega$, $R = 2005\Omega$ and $S = 200$. Find ΔR if bridge is not balanced. If the galvanometer sensitivity is $(S_i) 10\text{mm}/\mu\text{A}$, applied voltage is 5V and internal resistance of galvanometer is 100Ω . Find the deflection of the galvanometer. (12 Marks)

OR

- 2 a. Draw a neat circuit diagram and explain Desauty's modified bridge and derive relevant equation. (08 Marks)
- b. Explain how Schering bridge can be used to measure relative permittivity of dielectric material. (08 Marks)
- c. Explain fall of potential method of measuring earth resistance. (04 Marks)

Module-2

- 3 a. Derive the torque equation of a dynamometer type of wattmeter. List the errors that occur in it. (08 Marks)
- b. Explain :
i) Weston frequency meter
ii) Phase sequence indicators. (12 Marks)

OR

- 4 a. Explain the construction and working of a single phase power factor meter. (08 Marks)
- b. A 230V energy meter disc makes 10 revolutions when connected to a resistive load of 600W in 10 mins. Calculate the meter constant. (06 Marks)
- c. Discuss the various adjustment required in energy meters for accurate reading. (06 Marks)

Module-3

- 5 a. What are shunts and multipliers and explain how they are used to extend instrument range derive relevant expressions. (08 Marks)
- b. A moving coil meter gives full scale deflection with a current of 5mA. If the coil of the instrument has a resistance of 10Ω how can it be adopted to work as :
i) Ammeter of range (0 – 10A)
ii) Voltmeter of range (0 – 10V). (08 Marks)
- c. Explain turns compensation used instrument transformers. (04 Marks)

OR

- 6 a. Draw a neat circuit diagram and explain Silbee's method of testing Current Transform (CT). (12 Marks)
- b. With the help of a neat circuit diagram explain how flux density can be measured in a ring specimen. (08 Marks)

Module-4

- 7 a. List the advantage of electronic instruments. (04 Marks)
b. Explain construction and working of :
i) True RMS reading voltmeter
ii) RAMP type digital voltmeter. (16 Marks)

OR

- 8 a. Draw the block diagram of a electronic energy meter and explain its working. List its advantages. (12 Marks)
b. Explain the construction and working of a successive approximation type DVMS. (08 Marks)

Module-5

- 9 a. With relevant diagrams explain :
i) Seven segment displays
ii) Liquid crystal displays. (08 Marks)
b. Explain the working of Cathode Ray Tube (CRT) with a neat diagram. (08 Marks)
c. What are Bar graph displays and where are they used? (04 Marks)

OR

- 10 a. List the different types of recording devices and explain LVDT and strip chart types. (10 Marks)
b. Explain the following :
i) Nixie tubes
ii) ECG. (10 Marks)

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18EE46

Fourth Semester B.E. Degree Examination, July/August 2022

Operational Amplifiers and Linear IC's

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- Draw the block diagram of an Op – Amp and write the function of each block. (08 Marks)
 - Explain the working of Op – Amp as non – inverting amplifier. Derive the expression for its voltage gain. (08 Marks)
 - An Input of 3V is Fed to the non inverting terminal of an Op – Amp. The amplifier has $R_i = 10\text{ k}\Omega$ and $R_f = 10\text{ k}\Omega$. Find the output voltage. (04 Marks)

OR

- What is an Instrumentation Amplifier? Also obtain the expression for output voltage in terms of change in Resistance ΔR using transducer bridge. (08 Marks)
 - Draw and explain the 2 input inverting summing amplifier and derive its output voltage equation V_o . Also explain how to convert it to an averaging amplifier. (08 Marks)
 - Explain the Virtual ground concept of an Op - Amp. (04 Marks)

Module-2

- Draw the First Order Low Pass Butterworth filter and obtain its Frequency Response. (10 Marks)
 - Explain Working and design of voltage follower Regulator. (06 Marks)
 - Design a First Order Low Pass filter with a cut off frequency of 1KHz and Pass band gain of 2. Assume $C = 0.001\ \mu\text{F}$. (04 Marks)

OR

- Draw the First Order High Pass Butterworth filter and obtain its Frequency Response. (10 Marks)
 - With a neat circuit diagram, explain the Adjustable Voltage Regulator and its Operation. (06 Marks)
 - Find the Range in which output voltage can be varied with the help of 317 IC Regulator using $R_1 = 820\Omega$ and $R_2 = 10\text{K}\Omega$ potentiometer. (04 Marks)

Module-3

- Sketch the circuit of triangular waveform generator and explain its operation. (08 Marks)
 - Draw and explain the Operation of Non Inverting Zero Crossing detectors. (04 Marks)
 - Explain the working of voltage to current converter with grounded load. (08 Marks)

OR

- With a neat circuit diagram and waveforms, explain the Operation of inverting Schmitt trigger circuit. (08 Marks)
 - Give comparison between Schmitt trigger and Comparator. (04 Marks)
 - Explain the working of R – C phase shift oscillator using Op - Amp. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. With a neat circuit diagram, explain the Operation of Non Saturating precision half Wave Rectifier. (10 Marks)
b. Explain the working of Successive Approximation Type ADC with neat sketch. (10 Marks)

OR

- 8 a. Explain the Operation of R – 2R ladder digital to Analog Converter Circuit. (10 Marks)
b. With a neat circuit diagram, explain the working of Precision full wave Rectifier. (10 Marks)

Module-5

- 9 a. Draw the basic block diagram of Phase Locked Loop (PLL) and explain its each component. (10 Marks)
b. With a neat diagram, explain the Internal Architecture of IC 555 Timer. (10 Marks)

OR

- 10 a. Draw and explain working of Monostable Multivibrator using 555 Timer and draw its Input – Output wave forms. (12 Marks)
b. Define the following terms related to PLL :
i) Lock range ii) Capture range iii) Pull in Time iv) Tracking range. (08 Marks)

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18EE45

Fourth Semester B.E. Degree Examination, July/August 2022
Electromagnetic Field Theory

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Scalar and Vector, for a given two vectors :
 $\vec{A} = 2\vec{a}_x - 5\vec{a}_y - 4\vec{a}_z$ and $\vec{B} = 3\vec{a}_x + 5\vec{a}_y + 2\vec{a}_z$, solve to find the Dot product and angle between two vectors. (08 Marks)
- b. Obtain the relationship between Rectangular and Cylindrical coordinates. (06 Marks)
- c. Construct the Cartesian component of the vector,
 $\vec{H} = 20\vec{a}_r - 10\vec{a}_\phi + 3\vec{a}_z$ at $P(x = 5, y = 2, z = -1)$. (06 Marks)

OR

- 2 a. State and explain the Coulomb's law. (06 Marks)
- b. Define Electric Field Intensity at a point. Derive an expression for field intensity due to infinite line charge. (08 Marks)
- c. State and prove Gauss's law. (06 Marks)

Module-2

- 3 a. Show that Electric Field intensity is expressed as Negative Gradient of Scalar Potential. (08 Marks)
- b. Calculate the potential at the centre of a square with a side $a = 2$ mtr, while charges $2 \mu\text{C}$, $-4 \mu\text{C}$, $6 \mu\text{C}$ and $2 \mu\text{C}$ are located at its 4 corners. (06 Marks)
- c. Define Electric dipole. Obtain the expression for potential and electric field intensity due to a dipole. (06 Marks)

OR

- 4 a. Derive the boundary conditions between a conductor and dielectric. (08 Marks)
- b. Derive the continuity of current equation. (06 Marks)
- c. Obtain the expression for energy stored in a capacitor. (06 Marks)

Module-3

- 5 a. Derive the Poisson's and Laplace equations from Gauss law in point form in all the three co-ordinate system. (08 Marks)
- b. State and explain Biot-Savart law and Ampere's circuital law. (08 Marks)
- c. Solve to find the current density, given : $\vec{H} = (3y - z)\vec{a}_x + 2x\vec{a}_y$ A/m. (04 Marks)

OR

- 6 a. State and prove the Stoke's theorem. (08 Marks)
- b. Verify the potential field, given satisfies the Laplace's equation, $V = r \cos \phi + z$. (06 Marks)
- c. Derive the equation for point form of Ampere's law. (06 Marks)

Module-4

- 7 a. Derive an expression for force between two conductors carrying current in opposite direction. (08 Marks)
- b. A current element 4 cm long is along y-axis with a current of 10 mA flowing in y-direction. Determine the force on the current element due to the magnetic field, if $\vec{H} = \frac{5}{\mu} \hat{a}_x$ A/M. (06 Marks)
- c. State and explain Lorentz force equation (06 Marks)

OR

- 8 a. Derive the boundary conditions at the interface between two magnetic materials of different permeabilities. (08 Marks)
- b. Derive an expression for inductance of solenoid. (06 Marks)
- c. Given a ferrite material which will operate in a linear mode with $B = 0.05$ Tesla. Let $\mu_r = 50$. Calculate values of X_m , M and H . (06 Marks)

Module-5

- 9 a. State and explain Faraday's law. (06 Marks)
- b. What are the drawbacks of Ampere's law? Hence derive an expression for modified ampere's law. (08 Marks)
- c. Write Maxwell's equation in point form and integral form of time varying fields. (06 Marks)

OR

- 10 a. State and explain Poynting's theory with derivation $\vec{P} = \vec{E} \times \vec{H}$. (08 Marks)
- b. The magnetic field intensity of uniform plane wave in air is 20 A/m in \hat{a}_y direction. The wave is propagating in \hat{a}_z direction at an angular frequency of 2×10^9 rad/sec. Find
(i) Phase shift constant.
(ii) Wavelength.
(iii) Frequency. (06 Marks)
- c. Briefly explain the skin effect in conductors. (06 Marks)

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18EE44

Fourth Semester B.E. Degree Examination, July/August 2022 Electric Motors

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is back emf? Explain its significance. (06 Marks)
b. Derive an expression for the torque of a DC motor. (06 Marks)
c. A 250 V DC shunt motor runs at 1000 rpm on no load and takes 5A. The armature and shunt field resistances are 0.2Ω and 250Ω respectively. Calculate the speed when loaded and taking a current of 50 A. Due to armature reaction, the field weakened by 3%. (08 Marks)

OR

- 2 a. Explain the different methods of controlling speed of a DC shunt motor. (06 Marks)
b. Explain the necessity of a starter for a DC motor and explain the operation of a star delta starter with a neat sketch. (08 Marks)
c. Draw and explain the characteristics of DC series motor. (06 Marks)

Module-2

- 3 a. Explain the Swinburne's test to determine no load losses of a DC machine. What are the limitations of this test? (08 Marks)
b. When running on no load, a 400 V DC shunt motor takes 5 A, $R_a = 0.5 \Omega$ and $R_f = 200 \Omega$. Find the output of the motor and efficiency when running on full load and taking current of 50 A. (08 Marks)
c. Briefly explain the various losses occurring in a DC machine. (04 Marks)

OR

- 4 a. Derive Torque equation for a 3ϕ induction motor and derive condition for maximum torque. (08 Marks)
b. Discuss the complete Torque-slip characteristics of a 3ϕ induction motor including motoring generating and braking regions. (08 Marks)
c. A 4 pole, 3ϕ induction motor is supplied from 50 Hz supply. Determine its synchronous speed. On full load, its speed is observed to be 1410 rpm. Calculate its full load slip. (04 Marks)

Module-3

- 5 a. Starting from the fundamentals develop the equivalent circuit of a polyphase induction motor and explain how mechanical power developed is taken care of in the equivalent circuit. (10 Marks)
b. Describe the constructional features of a double cage and deep bar rotors of 3ϕ induction motors and explain its operation. (10 Marks)

OR

- 6 a. A 415 V, 29.84 kW, 50 Hz Delta connected motor gave the following test data :

No load test	415 V	21 A	1250 W
Blocked Rotor test	100 V	45 A	2730 W

Construct the circle diagram and determine

- (i) Line current and power factor for rated output. (14 Marks)
 (ii) The maximum Torque. Assume stator and rotor copper losses are equal at stand still. (06 Marks)

- b. Explain the phenomenon of cogging and crawling in a 3 ϕ Induction motor. (06 Marks)

Module-4

- 7 a. List the different methods of starting a squirrel cage induction motor and explain star-delta starter of 3 ϕ induction motor with a suitable circuit diagram. (10 Marks)
 b. Enumerate the speed control methods of 3 ϕ induction motor and explain supply frequency control method. (10 Marks)

OR

- 8 a. Explain the double field revolving theory as applied to a single phase induction motor and prove that it cannot produce any starting torque. (10 Marks)
 b. With a schematic connection diagram, explain the construction, working and applications of capacitor start 1 ϕ induction motor. (10 Marks)

Module-5

- 9 a. List the methods of starting synchronous motor and explain slip ring-induction motor with a neat sketch. (10 Marks)
 b. A factory has a total load of 1800 kW at a power factor of 0.6 lagging. If it is desired to improve the factory power factor to 0.95 lagging with the installation of synchronous condenser then calculate, (i) The KVA rating of synchronous condenser (ii) Total KVA of the factory. (10 Marks)

OR

- 10 a. Explain the operation of synchronous motor at constant load variable excitation and V and inverted V curves. (10 Marks)
 b. Explain the working, characteristics and applications of universal motor. (10 Marks)

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18EE43

Fourth Semester B.E. Degree Examination, July/August 2022 Transmission and Distribution

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Draw the line diagram of a typical transmission and distribution system indicating the standard voltages. (06 Marks)
- b. With usual notations, derive an expression for the sag of a transmission line when the supports are at equal levels. (06 Marks)
- c. Two towers of height 40 m and 30 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 300 m. If the tension in the conductor is 1500 kg, find the clearance of the conductor at a point midway between the supports. Weight of the conductor is 0.8 kg/m. Assume bases of the towers to be at the water level. (08 Marks)

OR

- 2 a. Write the methods of improving the string efficiency and explain any one of the method. (08 Marks)
- b. Each line of a three phase system is suspended by a string of three similar insulators. If the voltage across the line unit is 17.5 KV, calculate the line to neutral voltage and the string efficiency. Assume that the shunt capacitance between each insulator and earthed metal work of tower to be $1/8^{\text{th}}$ of the capacitance of the insulator. (06 Marks)
- c. Discuss the advantages of high voltage transmission. (06 Marks)

Module-2

- 3 a. Derive an expression for the inductance of a conductor due to internal and external flux. (12 Marks)
- b. Two conductors of a single phase line, each of 1 cm diameter are arranged in a vertical plane with one conductor mounted 1m above the other. A second identical line is mounted at the same height as the first and spaced horizontally 0.25 m apart from it. The two upper and the two lower conductors are connected in parallel. Determine the inductance per km of the resulting double circuit line. (08 Marks)

OR

- 4 a. Derive the expression for line to neutral capacitance of a three phase line with unsymmetrical spacing but transposed. (08 Marks)
- b. A 3-phase, 50 Hz, 66 KV overhead line conductors are placed in a horizontal plane 2m apart. Conductor diameter is 1.25 cm. The line length is 100 km. Calculate the capacitance per phase and charging current per phase. Assume complete transposition of the lines. (06 Marks)
- c. A single phase overhead line 30 km long consists of 2 parallel wires each 5 mm in diameter and 1.5 m apart. If the line voltage is 50 KV and 50 Hz, calculate charging current with line open circuited. (06 Marks)

Module-3

- 5 a. Write short note on classification of transmission lines. (06 Marks)
b. Determine the sending end voltage and sending end current for medium transmission lines, assuming nominal T-method. (06 Marks)
c. A 3 phase line delivers 5000 KW at 22 KV and at a p.f. of 0.8 lagging to a load. Determine:
(i) Sending end voltage
(ii) Percentage Regulation
(iii) Transmission efficiency.
The resistance and reactance of each conductor is 4Ω and 6Ω respectively. (08 Marks)

OR

- 6 a. Explain with vector diagram, the nominal π - method for obtaining the performance of medium transmission line. (08 Marks)
b. Two transmission lines having generalized circuit constants A_1, B_1, C_1, D_1 and A_2, B_2, C_2, D_2 are connected in (i) series and (ii) parallel. Derive expression for overall ABCD constant of the resulting network. (12 Marks)

Module-4

- 7 a. Explain the phenomenon of corona in overhead transmission line. (06 Marks)
b. Explain the following terms with reference to the corona:
(i) Critical disruptive voltage
(ii) Visual critical voltage (08 Marks)
c. A 33 KV, 3 phase underground cable, 4 km long uses three single core cables. Each of the conductor has a diameter of 2.5 cm and the radial thickness of insulation 0.5 cm. The relative permittivity of the dielectric is 3. Find:
(i) Capacitance of the cable/phase
(ii) Charging current/phase
(iii) Total charging KVAR (06 Marks)

OR

- 8 a. Define grading of cables. Explain capacitance grading. (08 Marks)
b. Derive the expression for the capacitance of a single core cable and give the expression for the maximum and minimum dielectric stress. (06 Marks)
c. Describe the various methods of reducing corona effect in an overhead transmission line. (06 Marks)

Module-5

- 9 a. Define: (i) Reliability (ii) Availability (iii) Adequacy (iv) Security (10 Marks)
b. A two wire dc distributor system is 3 km long and its supplies loads of 200 A, 100 A, 75 A and 50 A at 800 m, 1200 m, 2000 m and 3000 m from the feeding point A. Each conductor has go and return resistance of 0.004Ω per 100 m. Calculate the voltage at each load point if voltage at feeding point 250 V. (10 Marks)

OR

- 10 a. Explain the radial distribution system and Ring main distribution system. (10 Marks)
b. Explain with neat sketch different failure modes of bath tub curve. (05 Marks)
c. Write a note on power quality. (05 Marks)

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18MAT31

Third Semester B.E. Degree Examination, Feb./Mar. 2022 Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Evaluate (i) $L\left\{\frac{\cos 2t - \cos 3t}{t}\right\}$ (ii) $L(t^2 e^{-3t} \sin 2t)$ (06 Marks)
- b. If $f(t) = \begin{cases} t, & 0 \leq t \leq a \\ 2a - t, & a \leq t \leq 2a \end{cases}$, $f(t + 2a) = f(t)$ then show that $L(f(t)) = \frac{1}{s^2} \tanh\left(\frac{as}{2}\right)$ (07 Marks)
- c. Solve by using Laplace Transforms
 $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 4y = e^{-t}$, $y(0) = 0$, $y'(0) = 0$ (07 Marks)

OR

- 2 a. Evaluate $L^{-1}\left(\frac{4s+5}{(s+1)^2(s+2)}\right)$ (06 Marks)
- b. Find $L^{-1}\left(\frac{s}{(s^2+a^2)^2}\right)$ by using convolution theorem. (07 Marks)
- c. Express $f(t) = \begin{cases} \sin t, & 0 \leq t < \pi \\ \sin 2t, & \pi \leq t < 2\pi \\ \sin 3t, & t \geq 2\pi \end{cases}$
 in terms of unit step function and hence find its Laplace Transform. (07 Marks)

Module-2

- 3 a. Obtain fourier series for the function $f(x) = |x|$ in $(-\pi, \pi)$ (06 Marks)
- b. Expand $f(x) = \frac{(\pi-x)^2}{4}$ as a Fourier series in the interval $(0, 2\pi)$ and hence deduce that
 $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$ (07 Marks)
- c. Express y as a Fourier series upto the second harmonic given :

x:	0	60	120	180	240	300
y:	4	3	2	4	5	6

(07 Marks)

OR

- 4 a. Find the Half-Range sine series of $\pi x - x^2$ in the interval $(0, \pi)$ (06 Marks)
- b. Obtain fourier expansion of the function $f(x) = 2x - x^2$ in the interval $(0, 3)$. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- c. Obtain the Fourier expansion of y upto the first harmonic given :

x	0	1	2	3	4	5
y	9	18	24	28	26	20

(07 Marks)

Module-3

- 5 a. If $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$, find the Fourier transform of $f(x)$ and hence find the

value of $\int_0^{\infty} \frac{\sin x}{x} dx$

(06 Marks)

- b. Find the infinite Fourier cosine transform of e^{-ax} . (07 Marks)
 c. Solve using z-transform $y_{n+2} - 4y_n = 0$ given that $y_0 = 0, y_1 = 2$ (07 Marks)

OR

- 6 a. Find the fourier sine transform of $f(x) = e^{-|x|}$ and

hence evaluate $\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx ; m > 0$.

(06 Marks)

- b. Obtain the z-transform of $\cos n\theta$ and $\sin n\theta$. (07 Marks)
 c. Find the inverse z-transform of

$$\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$$

(07 Marks)

Module-4

- 7 a. Solve $\frac{dy}{dx} = x^3 + y$, $y(1) = 1$ using Taylor's series method considering up to fourth degree terms and find $y(1.1)$. (06 Marks)

- b. Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ compute $y(0.2)$ by taking $h = 0.2$ using Runge - Kutta method of fourth order. (07 Marks)

- c. If $\frac{dy}{dx} = 2e^x - y$, $y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.040$ and $y(0.3) = 2.090$, find $y(0.4)$ correct to 4 decimal places using Adams-Bashforth method. (07 Marks)

OR

- 8 a. Use fourth order Runge-Kutta method, to find $y(0.8)$ with $h = 0.4$, given $\frac{dy}{dx} = \sqrt{x+y}$, $y(0.4) = 0.41$ (06 Marks)

- b. Use modified Euler's method to compute $y(20.2)$ and $y(20.4)$ given that $\frac{dy}{dx} = \log_{10} \left(\frac{x}{y} \right)$ with $y(20) = 5$ Taking $h = 0.2$. (07 Marks)

- c. Apply Milne's predictor-corrector formulae to compute $y(2.0)$ given $\frac{dy}{dx} = \frac{x+y}{2}$ with

x	0.0	0.5	1.0	1.5
y	2.000	2.6360	3.5950	4.9680

(07 Marks)

Module-5

- 9 a. Using Runge-Kutta method, solve

$$\frac{d^2y}{dx^2} = x \left(\frac{dy}{dx} \right)^2 - y^2, \text{ for } x = 0.2, \text{ correct to four decimal places, using initial conditions } y(0) = 1, y'(0) = 0$$

(07 Marks)

- b. Derive Euler's equation in the standard form viz,
- $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$

(07 Marks)

- c. Find the extremal of the functional
- $\int_{x_1}^{x_2} (y^2 + y'^2 + 2ye^x) dx$

(06 Marks)

OR

- 10 a. Given the differential equation
- $2 \frac{d^2y}{dx^2} = 4x + \frac{dy}{dx}$
- and the following table of initial values:

x	1	1.1	1.2	1.3
y	2	2.2156	2.4649	2.7514
y'	2	2.3178	2.6725	2.0657

Compute y(1.4) by applying Milne's Predictor-corrector formula.

(07 Marks)

- b. Prove that geodesics of a plane surface are straight lines.

(07 Marks)

- c. On what curves can the functional
- $\int_0^1 (y'^2 + 12xy) dx$
- with
- $y(0) = 0, y(1) = 1$
- can be extremized?

(06 Marks)

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18MATDIP31

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find the modulus and amplitude of the complex number : $\frac{(2-3i)(2+i)^2}{1+i}$. (07 Marks)
- b. Prove that $\left(\frac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^n = \cos n\theta + i\sin n\theta$. (06 Marks)
- c. Show that the vectors $\vec{a}-2\vec{b}+3\vec{c}$, $-2\vec{a}+3\vec{b}-4\vec{c}$, $-\vec{b}+2\vec{c}$ are coplanar. (07 Marks)

OR

- 2 a. Given $\vec{a} = 2\hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = 6\hat{i} - 3\hat{j} + 2\hat{k}$. Find : i) $\vec{a} \cdot \vec{b}$ ii) $\vec{a} \times \vec{b}$ iii) $|\vec{a} \times \vec{b}|$. (07 Marks)
- b. Determine the value of λ , so that $\vec{a} = 2\hat{i} + \lambda\hat{j} - \hat{k}$, and $\vec{b} = 4\hat{i} - 2\hat{j} - 2\hat{k}$, are perpendicular. (06 Marks)
- c. Express $1 - i\sqrt{3}$ in the polar form and hence find its modulus and amplitude. (07 Marks)

Module-2

- 3 a. Using Euler's theorem, prove that $xu_x + yu_y = -3 \cot u$ where $u = \sin^{-1}\left(\frac{x^2 y^2}{x+y}\right)$. (07 Marks)
- b. Using Maclaurin's series, prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{24} + \dots$. (06 Marks)
- c. If $u = x + 3y^2$, $v = 4x^2yz$, $w = 2z^2 - xy$, evaluate $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ at the point $(1, -1, 0)$. (07 Marks)

OR

- 4 a. Obtain Maclaurin's series expansion for the function e^x upto x^4 . (07 Marks)
- b. If $u = \sin^{-1}\left[\frac{x^3 + y^3}{x+y}\right]$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 2 \tan u$. (06 Marks)
- c. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 0$. (07 Marks)

Module-3

- 5 a. A particle moves along the curve $x = (1 - t^3)$, $y = (1 + t^2)$, $z = (2t - 5)$ determine its velocity and acceleration at $t = 1$ sec. (07 Marks)
- b. If $\vec{F} = 2x^2 \hat{i} - 3yz \hat{j} + xz^2 \hat{k}$, and $\phi = 2z - x^3y$, find $\vec{F} \cdot (\nabla\phi)$ and $\vec{F} \times (\nabla\phi)$ at $(1, -1, 1)$. (06 Marks)
- c. Find the constants a, b, c so that $\vec{f} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is irrotational. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at $(1, -2, -1)$ along $\vec{a} = 2\hat{i} - \hat{j} - 2\hat{k}$ (07 Marks)
- b. Find curl \vec{f} given that $\vec{f} = xyz^2\hat{i} + xy^2z\hat{j} + x^2yz\hat{k}$. (06 Marks)
- c. If $\vec{f} = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$ and $\vec{g} = yzi + zxj + xyk$. Show that $\vec{f} \times \vec{g}$ is a solenoidal vector. (07 Marks)

Module-4

- 7 a. Obtain the reduction formula, $I_n = \int \cos^n x dx$, where n is a positive integer. (07 Marks)
- b. Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy dy dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^1 (x + y + z) dx dy dz$. (07 Marks)

OR

- 8 a. Evaluate: $\int_0^{\pi/6} \sin^6(3x) dx$. (07 Marks)
- b. Evaluate: $\int_0^{\pi} x \sin^4 x \cos^6 x dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^y xyz dx dy dz$. (07 Marks)

Module-5

- 9 a. Solve: $(2x + y + 1) dx + (x + 2y + 1) dy = 0$. (07 Marks)
- b. Solve: $(4xy + 3y^2 - x) dx + (x^2 + 2xy) dy = 0$. (06 Marks)
- c. Solve: $y(2xy + e^x) dx - e^x dy = 0$. (07 Marks)

OR

- 10 a. Solve: $(5x^4 + 3x^2y^2 - 2xy^3) dx + (2x^3y - 3x^2y^2 - 5y^4) dy = 0$. (07 Marks)
- b. Solve: $y(2xy + 1) dx - x dy = 0$. (06 Marks)
- c. Solve: $\frac{dy}{dx} + y \cot x = \cos x$. (07 Marks)

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18EE32

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Electric Circuit Analysis

Time: 3 hrs.

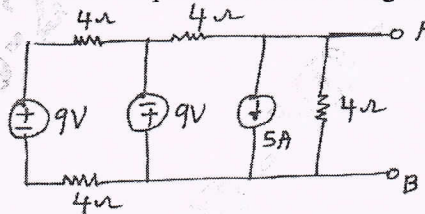
Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

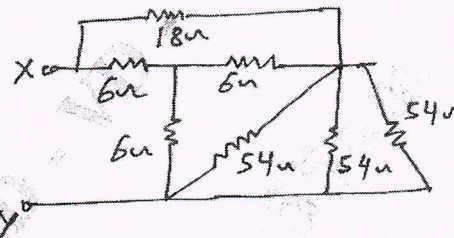
- 1 a. Use Source transformation and Source shift methods to convert the circuit shown in Fig. Q1(a) to a single current source in parallel with a single resistor. (06 Marks)

Fig. Q1(a)



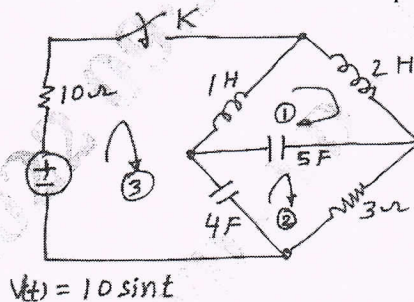
- b. Compute the resistance across the terminals XY of network, shown in Fig. Q1(b). (06 Marks)

Fig. Q1(b)



- c. For the network shown in Fig. Q1(c), write the mesh equations for the meshes indicated in time domain. Draw the dual network and write its nodal equations. (08 Marks)

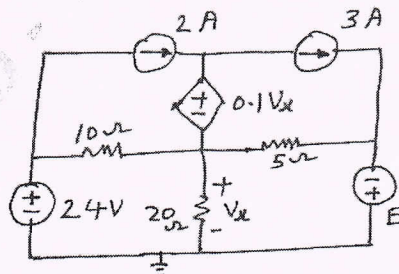
Fig. Q1(c)



OR

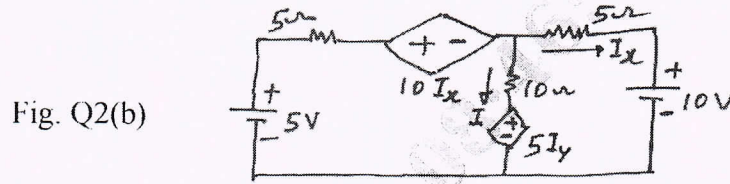
- 2 a. Use Node equations to determine what value of E will cause V_x to be zero for the circuit shown in Fig. Q2(a). (08 Marks)

Fig. Q2(a)

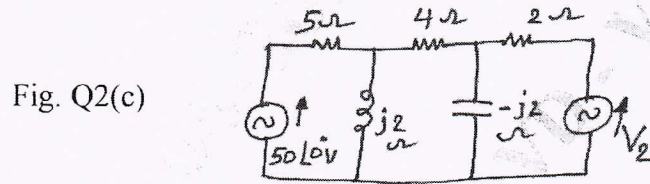


Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- b. Using Mesh analysis, find the current through 10Ω resistor in the circuit shown in Fig. Q2(b). (06 Marks)

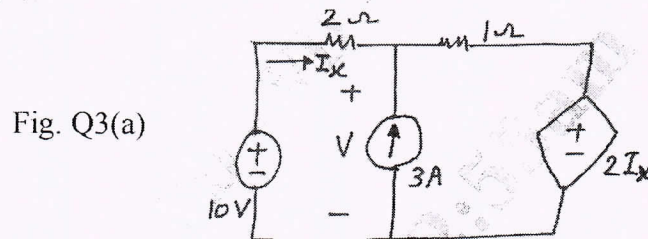


- c. In the circuit shown in Fig. Q2(c), determine V_2 which results in zero current through 4Ω resistor. Use Mesh current analysis. (06 Marks)

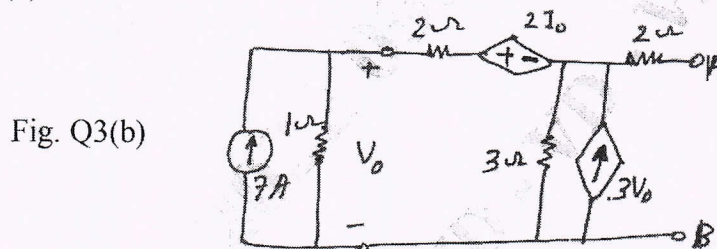


Module-2

- 3 a. Use Superposition principle to find the current in 2Ω resistor in the network shown in Fig. Q3(a). (06 Marks)



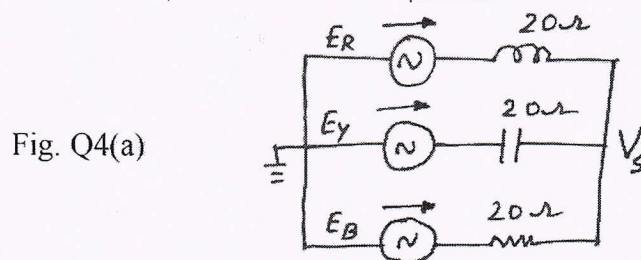
- b. Find the Thevenin and Norton equivalent circuit at terminals AB for the circuit shown in Fig. Q3(b). (10 Marks)



- c. State and prove maximum Power Transfer theorem as applied to DC network. (04 Marks)

OR

- 4 a. Use Millman's theorem to determine the voltage ' V_s ' of the network shown in Fig. Q4(a). Given that $E_R = 230 \angle 0^\circ$ V ; $E_Y = 230 \angle -120^\circ$ V ; $E_B = 230 \angle 120^\circ$ V. (06 Marks)



- b. For the circuit shown in Fig. Q4(b), determine the impedance Z_X such that maximum power is transferred from the source to the load of impedance Z_X . (08 Marks)

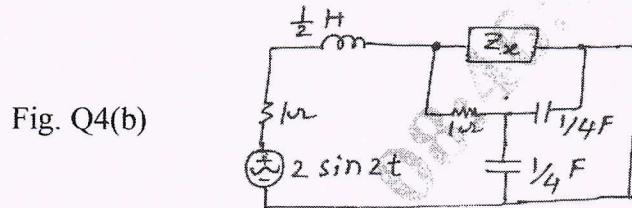


Fig. Q4(b)

- c. Verify Reciprocity theorem for the circuit shown in Fig. Q4(c). (06 Marks)

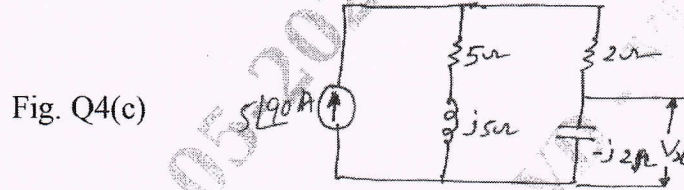


Fig. Q4(c)

Module-3

- 5 a. Define Q of the circuit and show that the resonant frequency is the geometric mean of half power frequencies. (07 Marks)
 b. Determine the RLC parallel circuit parameters whose impedance response curve is shown in Fig. Q5(b). What are the new values of W_r and bandwidth if 'C' is increased 4 times? (07 Marks)

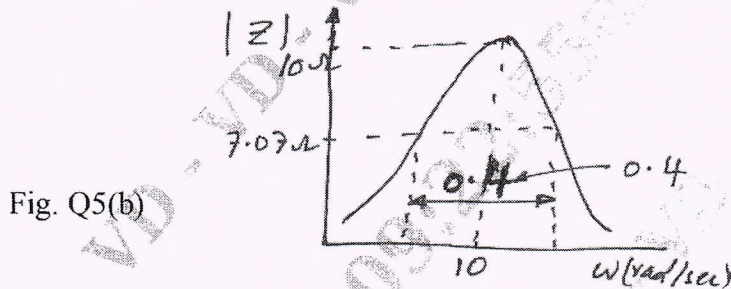


Fig. Q5(b)

- c. A parallel R – L circuit is energized by a current source of 1A. The switch across the source is opened at $t = 0^+$. Solve for V, DV and D^2V at $t = 0^+$, if $R = 100\Omega$ and $L = 1H$. (06 Marks)

OR

- 6 a. A two branch anti resonant circuit contains $L = 0.4H$ and $C = 40\mu F$. Resonance is to be achieved by variation of R_L and R_C . Calculate the resonance frequency for the following cases : i) $R_L = 120\Omega$; $R_C = 80\Omega$ ii) $R_L = 80\Omega$; $R_C = 0$ iii) $R_L = R_C = 100\Omega$. (08 Marks)

- b. Determine i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$, when the switch K is moved from position 1 to 2 at $t = 0$ in the network shown in Fig. Q6(b). Steady state having been reached before switching. (06 Marks)

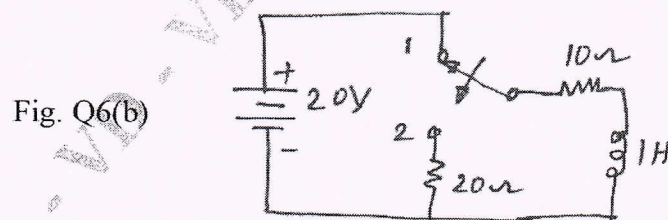
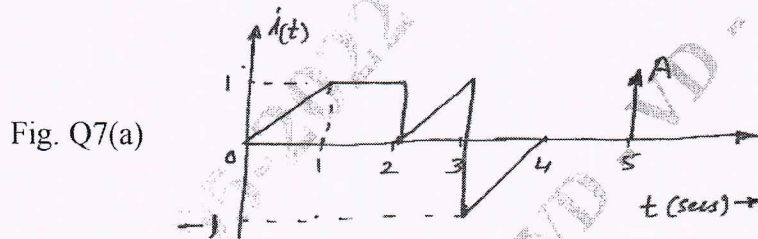


Fig. Q6(b)

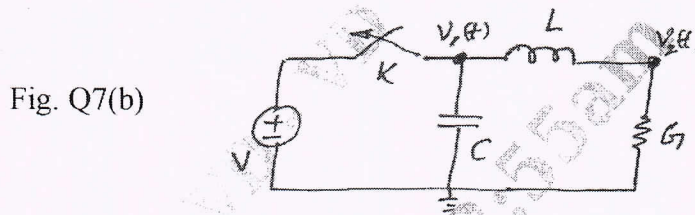
- c. Why do we need to study initial conditions? Write the equivalent form of the elements in terms of the initial and final conditions of the element. (06 Marks)

Module-4

- 7 a. The current function $i(t)$ shown in Fig. Q7(a) is impressed on a capacitor 'C'. What should be the strength 'A' of the impulse so that the voltage across the 'C' becomes zero for $t > 5$ sec. (10 Marks)

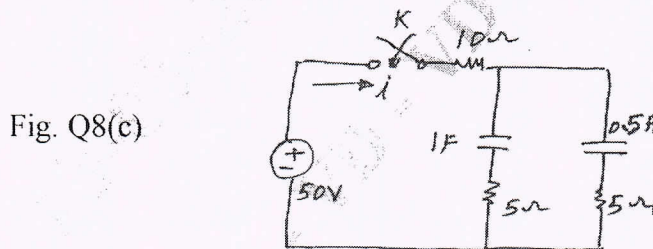


- b. In the circuit shown in Fig. Q7(b), the switch is opened at $t = 0$, with $V = 1V$, $C = 1F$, $L = \frac{1}{2}H$ and $G = 1\Omega$. Find the node voltages $V_1(t)$ and $V_2(t)$ by Laplace transform method. (10 Marks)



OR

- 8 a. State and prove Initial and Final value theorems. (08 Marks)
 b. If $f(t) = 2t$, sketch the following i) $f(t - 2)u(t)$ ii) $f(t)u(t - 2)$ iii) $f(t - 2)u(t - 2)$
 iv) $f(t)\delta(t)$ v) $f(t)\delta(t - 2)$. (06 Marks)
 c. In the circuit shown in Fig. Q8(c), the switch is closed at $t = 0$ and there is no initial charge on either of the capacitors. Find the resulting current 'i'. Using Laplace transformation. (06 Marks)



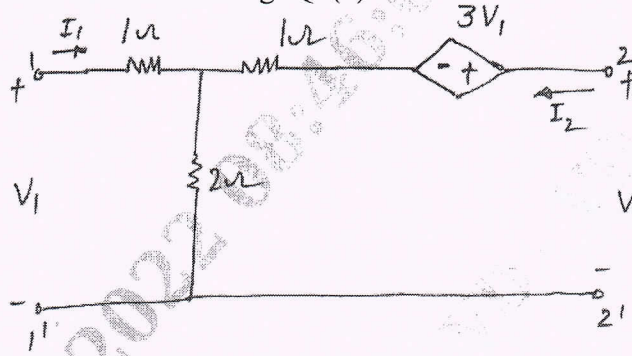
Module-5

- 9 a. A three phase, 4 – wire 150V, CBA system has a star connected load with $Z_A = 6 \angle 0^\circ \Omega$, $Z_B = 6 \angle 30^\circ \Omega$ and $Z_C = 5 \angle 45^\circ \Omega$. Obtain all the i) Line currents ii) Currents in the neutral iii) Hence draw the Phasor diagram. (08 Marks)
 b. Define $[Z]$ and $[Y]$ of a two port network and derive for $[Z]$ in terms of $[Y]$. (08 Marks)

c. Determine $[Z]$ for the network shown in Fig. Q9(c).

(04 Marks)

Fig. Q9(c)



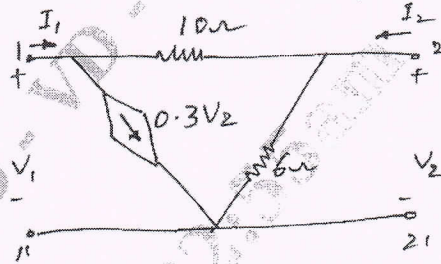
OR

10 a. A three phase, 339.4V, ABC system has a delta connected load with $Z_{AB} = 10 \angle 0^\circ \Omega$, $Z_{BC} = 10 \angle 30^\circ \Omega$ and $Z_{CA} = 15 \angle -30^\circ \Omega$. Obtain phase and line currents as well as draw the phasor diagram. Assume V_{BC} as a reference phasor.

(10 Marks)

b. Obtain $[Z]$ and $[Y]$ for the two port network shown in Fig. Q10(b).

Fig. Q10(b)



(10 Marks)

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18EE33

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Transformers and Generators

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With the help of phasor diagram, explain the operation of practical transformer on load. (06 Marks)
- b. Find the all day efficiency of single phase transformer having a maximum efficiency of 98% at 15KVA, UPF and loaded as follows:
 12 hours → 2kW, 0.5pf lagging
 6 hours → 2kW, 0.8pf lagging
 6 hours → no load. (08 Marks)
- c. Explain with neat circuit diagram and phasor diagram the operation of star-star connected 3 phase transformer. (06 Marks)

OR

- 2 a. Explain with the help of connection and phasor diagram how SCOTT connections are used to obtain two phase from three phase supply. (06 Marks)
- b. A 5KVA, 500/250V, 50Hz single phase transformer gave the following readings,
 OC test : 500V, 1A, 50W [LV side open]
 SC test : 25V, 10A, 60W [LV side shorted]
 Determine:
 i) Efficiency on full load and 0.8pf lagging.
 ii) Voltage regulation on full load and 0.8pf leading.
 iii) Efficiency on 60% of full load and 0.8pf leading.
 iv) Draw the equivalent circuit referred to primary and insert all values in it. (10 Marks)
- c. Mention the advantages of delta-delta connected 3 phase transformer [Any four]. (04 Marks)

Module-2

- 3 a. With a neat circuit diagram, explain Sumpner's test conducted on two identical transformers. Also show how efficiency and regulation are calculated from Sumpner's test data. (08 Marks)
- b. Why parallel operation two single phase transformers are needed and mention the necessary conditions to be satisfied for parallel operation. (06 Marks)
- c. With a neat diagram, explain the operation of on-load tap changer. (06 Marks)

OR

- 4 a. With a neat diagram show the current distribution in step up and step down Auto transformer. Also derive the expression for saving of copper in an Auto transformer. (10 Marks)
- b. Obtain the expression for load sharing during the parallel operation of two transformers having same voltage ratios. (06 Marks)
- c. Explain how the Eddy current losses and hysteresis losses are separated in a single phase transformer. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Explain how the equivalent circuit parameters are obtained for a three winding transformers. (08 Marks)
- b. What is armature reaction in DC machines? Explain how armature reaction produces demagnetizing and cross magnetizing effect. Also derive the necessary expressions for demagnetizing and cross magnetizing ampere turns. (08 Marks)
- c. Write short notes on concentrated and distributed winding in a synchronous generator. (04 Marks)

OR

- 6 a. Derive the Emf equation of an alternator. Also derive an expression for pitch factor and distribution factor. (10 Marks)
- b. What is commutation? With a neat diagram, explain the process of commutation. (06 Marks)
- c. Mention reasons for using three winding transformers. (04 Marks)

Module-4

- 7 a. Explain the method of determining voltage regulation of synchronous generator by ZPF method with all the circuit diagram necessary in the test. (12 Marks)
- b. The OC and SC test readings for a 3 ϕ star connected 1000KVA, 2000V, 50Hz alternator are

I_f	10	20	25	30	40	50
V_{OC} line voltage	800	1500	1760	2000	2350	2600
I_{asc}	-	200	250	300	-	-

The armature resistance is $0.2\Omega/ph$. Draw the characteristic curves and estimate the percentage regulation by EMF method at i) FL, 0.8pf lag ii) FL, 0.8pf lead. (08 Marks)

OR

- 8 a. Explain the method of determining voltage regulation of alternator by MMF method with all necessary circuit diagrams in the test. (12 Marks)
- b. Derive the expression for EMF induced in terms of terminal voltage, load current, armature resistance, synchronous reactance along with phasor diagram for lagging and leading PF load. (08 Marks)

Module-5

- 9 a. Mention the necessary conditions for synchronization of alternators. Explain the lamp dark and lamp bright method of synchronization of alternators. (12 Marks)
- b. Write short notes on hunting in synchronous machine. Also explain the role of damper windings. (08 Marks)

OR

- 10 a. With a neat circuit diagram, explain the method of determination of X_d and X_q of salient pole alternators. (10 Marks)
- b. Write short notes on capability curves of a synchronous generators. (06 Marks)
- c. Mention any four advantages of operating alternators in parallel. (04 Marks)

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18EE34

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Analog Electronic Circuits

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. For the circuit shown in Fig Q1(a) sketch the output waveforms and transfer characteristics for cut in voltage of diode is 0.7V

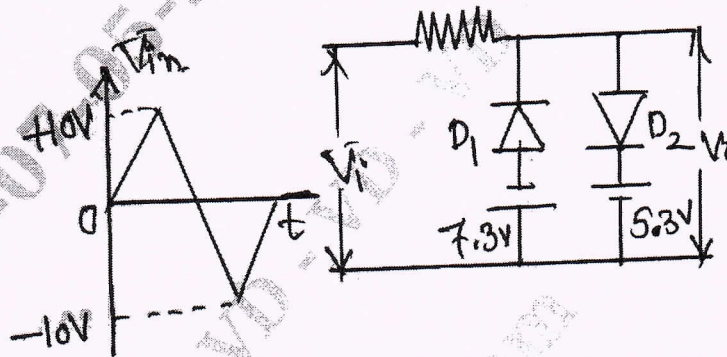


Fig Q1(a)

(08 Marks)

- b. With a neat circuit diagram, explain self bias circuit, write the necessary equations. (08 Marks)
- c. Define stability factor and derive the expression for stability factor of fixed base circuit with respect to I_{CO} . (04 Marks)

OR

- 2 a. Derive an expression for E_{TH} , I_B and V_{CE} for voltage divider bias circuit using exact analysis. (08 Marks)
- b. What is clamping circuit? Explain the negative clamping circuit with and without reference voltage with necessary waveforms. (08 Marks)
- c. List the important applications of clipping and clamping circuits. (04 Marks)

Module-2

- 3 a. With the help of r_e equivalent model, derive an equation for Z_i , Z_o and A_v for an emitter follower configuration. (08 Marks)
- b. State and prove Millers theorem. (08 Marks)
- c. Compare the characteristics of CB, CC and CE configurations. (04 Marks)

OR

- 4 a. Starting from fundamental define h-parameters and obtain an h-parameter equivalent circuit of common emitter configuration. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- b. For the circuit shown below, determine : i) r_e ii) Z_i, Z_o, A_v and A_i taking $r_o = \infty \Omega$

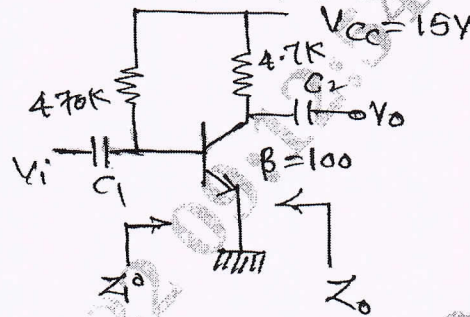


Fig Q4(b)

- c. What are the advantages of h-parameters?

(08 Marks)
(04 Marks)

Module-3

- 5 a. Derive expressions for Z_i, Z_o and A_i for a Darlington emitter follower circuit. (10 Marks)
 b. Draw and explain the block diagram of multistage cascade amplifier. (06 Marks)
 c. Write important characteristics of Darlington emitter follower. (04 Marks)

OR

- 6 a. For a current series feedback amplifier, derive an expression for Z_{if} and Z_{of} . (10 Marks)
 b. Explain the general characteristics of negative feedback amplifier. (10 Marks)

Module-4

- 7 a. Explain the operation of class B push-pull amplifier. Prove that the maximum efficiency of class B configuration is 78.5%. (08 Marks)
 b. With a neat diagram and waveform, explain the operation of RC phase shift oscillator using BJT. Write the expression for frequency of oscillation. (08 Marks)
 c. A crystal has following parameters $L = 0.3344H, C = 0.065pF, C_M = 1pF$ and $R = 5.5K\Omega$. Calculate : i) Series resonance frequency ii) Parallel resonance frequency. (04 Marks)

OR

- 8 a. With a neat diagram, explain basic principle of operation of oscillators and write the condition to obtain sustained oscillations. (08 Marks)
 b. Prove that the maximum conversion efficiency of class A transformer coupled amplifier is 50%. (08 Marks)
 c. The following readings are available for a power amplifier, calculate the second harmonic distortion in each case.

$$V_{CEQ} = 10V \quad V_{CE(max)} = 18V \quad V_{CE(min)} = 1V$$

$$V_{CEQ} = 10V \quad V_{CE(max)} = 19V \quad V_{CE(min)} = 1V$$

(04 Marks)

Module-5

- 9 a. Explain the construction working and characteristics of an n-channel JFET. (10 Marks)
 b. Define transconductance (g_m) and derive an expression for " g_m ". (06 Marks)
 c. Compare BJT and JFET. (04 Marks)

OR

- 10 a. With neat sketch, explain the basic construction operation and characteristic of n-channel depletion type MOSFET. (10 Marks)
 b. Derive the expression for A_v, Z_i and Z_o for a JFET common source amplifier with fixed bias configuration. (10 Marks)

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18EE35

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Digital System Design

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the definition of combinational logic. Convert the given Boolean expression into minterm canonical form and maxterm canonical form.

$$F(x, y, z) = X + \bar{x} \bar{z}(y + z)$$
 (08 Marks)
 - b. Simplify the function :

$$Y = f(a, b, c, d) = \sum m(2, 3, 4, 5, 13, 15) + \sum d(8, 9, 10, 11)$$
 using Karnaugh map. (06 Marks)
 - c. Simplify the function :

$$Y = f(a, b, c, d) = \pi M(0, 4, 5, 7, 8, 9, 11, 12, 13, 15)$$
 using the Karnaugh map. (06 Marks)

OR

- 2 a. Simplify wing the Quine – McClusky minimization technique :

$$Y = f(a, b, c, d) = \sum m(0, 2, 8, 10)$$
 (08 Marks)
 - b. Using the Quine – McCluskey method, obtain all the prime impicates for the following Boolean function :

$$f(a, b, c, d) = \pi M(0, 2, 3, 4, 5, 12, 13) + dc(8, 10)$$
 (12 Marks)

Module-2

- 3 a. With the aid of general structure, clearly distinguish between a decoder and encoder. (06 Marks)
 - b. Implement the following Boolean function using 4 : 1 multiplexer.

$$F(A, B, C) = \sum m(1, 3, 5, 6)$$
 (06 Marks)
 - c. Implement full subtractor using a decoder and two NAND gates and write its truth table. (08 Marks)

OR

- 4 a. What is carry look ahead adder? Explain general organization of it. (06 Marks)
 - b. Write a truth table for two – bit magnitude comparator. Write the Karnaugh map for each output of two bit magnitude comparator and the resulting equation. (14 Marks)

Module-3

- 5 a. What is a Flip-Flop? Discuss the working principle of SR Flip Flop with its truth table. Also high light the role of SR Flip Flop in switch debouncer circuit. (12 Marks)
 - b. Explain the operation of Master - Slave JK flip-flop along with its circuit diagram. (08 Marks)

OR

- 6 a. Draw and explain the working of Positive and Negative edge triggered D flip-flop. (12 Marks)
 - b. Derive the characteristic equations for D, JK, T and SR flip flops. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Explain with suitable logic and timing diagram :
 i) Serial-in serial-out shift register
 ii) Parallel-in parallel out shift register. **(10 Marks)**
 b. Compare Registers and Counters. Explain the working of 4-bit Asynchronous counter using JK flip-flops. **(10 Marks)**

OR

- 8 a. Describe the block diagram of a MOD – 7 Johnson counter and explain its operation. Give the count sequence table and the decoding logic used to identify the various states. **(10 Marks)**
 b. Design a MOD – 5 synchronous binary counter using clocked J-K flip-flops. **(10 Marks)**

Module-5

- 9 a. With a suitable example, explain Mealy and Moore model in a sequential circuit analysis. **(08 Marks)**
 b. A sequential circuit has one input and one output. The state diagram is as shown in Fig.Q9(b). Design a sequential circuit with 'T' flip-flop.

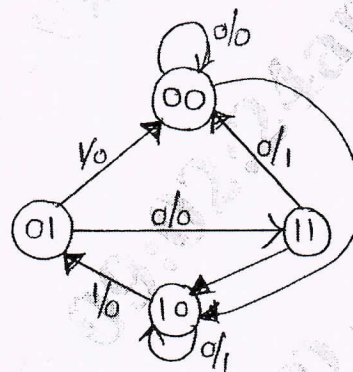


Fig.Q9(b)

(12 Marks)

OR

- 10 a. With a basic structure, explain clearly Programmable Read Only Memories (PROMS) and EPROM. **(13 Marks)**
 b. Write short note on :
 i) Read only and Read/Write memories
 ii) Flash memory. **(07 Marks)**

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18EE36

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Electrical and Electronic Measurements

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Analyze unbalanced operation of Wheatstone bridge and derive bridge sensitivity. (08 Marks)
 b. Obtain the balance equation for Hay's bridge used for the measurement of inductance. Draw the phasor diagram at the balanced condition. (07 Marks)
 c. A Kelvin double bridge is balanced with the following constants, outer ratio arms 100Ω and 1000Ω , inner ratio arms 99.92Ω and 1000.6Ω . Resistance of the link 0.1Ω . Standard resistance 0.00377Ω . Calculate the unknown resistance. (05 Marks)

OR

- 2 a. With diagram explain how Megger can be used for measurement of very high resistance. (08 Marks)
 b. Obtain the balance equation for Schering bridge used for the measurement of capacitance. (06 Marks)
 c. The four arms of the Maxwell's capacitance bridge at balance are :
 Arm ab : unknown inductance L_1 having an internal resistance R_1
 Arm bc : A non-inductive resistance of 1000Ω
 Arm cd : A capacitor of $0.5 \mu\text{F}$ in parallel with a resistance of 1000Ω
 Arm da : A resistance of 1000Ω
 Determine the values of R_1 and L_1 . (06 Marks)

Module-2

- 3 a. Show that deflecting torque $T_d = VI \cos \phi$ for UPF Wattmeter. (07 Marks)
 b. With a neat sketch explain the construction and working of a single phase dynamometer type power factor meter. (07 Marks)
 c. The constant of energy meter is 750 revolutions per kwhr. Calculate the number of revolutions made by it, when connected to a load carrying 100A at 230V and 0.8 power factor in 30 seconds. If it makes 110 revolutions in 30 seconds, find the percentage error. (06 Marks)

OR

- 4 a. With circuit and phasor diagram explain the theory and operation of single phase induction type energy meter. (10 Marks)
 b. What is creeping in energy meter? How it is prevented? (04 Marks)
 c. Explain how reactive power can be measured with single wattmeter in a three phase circuit. (06 Marks)

Module-3

- 5 a. What is Shunt? How it is used to extend the range of an ammeter. (04 Marks)
 b. Write the equivalent circuit and vector diagram of a current transformer. Give the expression for its ratio and phase angle error. (08 Marks)
 c. With circuit diagram, explain the measurement of fluxdensity inside a ring specimen of magnetic material. (08 Marks)

OR

- 6 a. Explain why magnetic measurement in Ferro – magnetic material is important. (03 Marks)
b. Explain the theory and operation of the comparative deflection method of testing a CT by Silsbee's method. (10 Marks)
c. A potential transformer of ratio 1000/100V has the following constants $r_p = 95\Omega$, $R_p = 0.9\Omega$, $x_p = 68\Omega$, $x_p = 120\Omega$, $I_0 = 0.02A$ at a power factor of 0.4. calculate :
i) Phase angle error at no-load
ii) Load in VA at Upf at which the phase angle will be zero. (07 Marks)

Module-4

- 7 a. What are the essentials of an electronic instrument and explain. (05 Marks)
b. With block diagram explain the working of true RMS recording voltmeter. (07 Marks)
c. With circuit, explain the principle of operation of electronic multimeter. (08 Marks)

OR

- 8 a. Mention the advantages of electronic instruments. (04 Marks)
b. Explain with block diagram the dual slope integrating type digital voltmeter. (08 Marks)
c. What is the working principle of Q-meter? With circuit, explain how Q-factor and inductance of an unknown coil be measured using Q-meter. (08 Marks)

Module-5

- 9 a. Explain :
i) Segmental display
ii) Dot matrix display. (06 Marks)
b. Explain the operation of LED display. Mention its advantages. (08 Marks)
c. With a basic circuit, explain the operation of potentiometric recorder. (06 Marks)

OR

- 10 a. With schematic, explain the operation of gas discharge plasma display. (06 Marks)
b. With the help of neat block diagram, explain the operation of ECG machine. (08 Marks)
c. Explain the operation of LVDT type recorder. (06 Marks)

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Question Paper Version : B

Third/Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Constitution of India, Professional Ethics and Cyber Law

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the hundred questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners on the OMR sheets are strictly prohibited.**

1. Which one of the following does not take part in the Election of the President?
 - a) Elected Members of Lok - Sabha
 - b) Elected Members of Rajya - Sabha
 - c) Members of the Legislative Council
 - d) None of these
 2. The President can be removed by impeachment procedure on the ground of violating the Constitution by
 - a) The Supreme Court
 - b) The Lok - Sabha only
 - c) Both Houses of Parliament
 - d) The High Court
 3. The Vice - President of India is Elected by the
 - a) People
 - b) Members of State - Legislative Assembly
 - c) Members of the Rajya - Sabha
 - d) Members of both the Houses of Parliament at Joint sitting.
 4. Who discharges the duties of the President in the event of President and Vice - President being not available?
 - a) The Prime Minister
 - b) The Chief Justice of India
 - c) The Speaker of Lok - Sabha
 - d) The Attorney General of India
 5. Which one of the following can the President of India declare?
 - a) Emergency due to threat of War, external aggression or armed rebellion
 - b) Emergency due to breakdown of constitutional machinery in the State
 - c) Financial emergency on account of threat to the financial credit of India
 - d) All the above.
 6. Which budget is placed first in the Parliament House
 - a) Railway
 - b) General budget
 - c) Financial
 - d) Vote of credit
7. The President can make Laws through ordinances
 - a) During the recess of the Parliament
 - b) On certain subjects even when Parliament is in session
 - c) Only on subjects contained in the concurrent list
 - d) Under no circumstances.
 8. The President can grant pardon in
 - a) All cases of punishment by Court martial
 - b) All offences against laws in the Union and Concurrent list
 - c) All cases involving death sentence
 - d) All the above cases
 9. If State fails to comply with the directives of the Central Government, the President can
 - a) Declare break - down of Constitutional machinery in the State and assume responsibility for its governance
 - b) Send reserve police force to secure compliance with directions
 - c) Dissolve the State legislature and order fresh elections
 - d) Can do either (a) or (b)
 10. Which one of the following has been wrongly listed as Judicial power of the President of India?
 - a) He appoints the Chief Justice and other Judges of the Supreme Court
 - b) He can grant pardon, reprieve and respite to a person awarded punishment
 - c) He can consult the Supreme Court on any question of law or fact.
 - d) He can remove the Judges of Supreme - Court on ground of misconduct.
 11. Who decides disputes regarding disqualification of Members of Parliament?
 - a) The President
 - b) The Concerned house
 - c) The Election Commission.
 - d) The President in consultation with the Election Commission.
 12. Who presides over the Lok Sabha if neither the Speaker nor the Deputy Speaker is not available?
 - a) A member nominated by the President.
 - b) A member chosen by the Council of Ministers.
 - c) A member of the panel of Chairman announced by the Speaker.
 - d) The Senior most member of the Lok - Sabha.
 13. Lok Sabha is superior to the Rajya Sabha because
 - a) It is directly elected
 - b) It alone controls the finances
 - c) It can oust the Council of Ministers through a Vote of no - Confidence
 - d) of all the above reasons.
 14. The Supreme Court of India was setup
 - a) By the Constitution
 - b) Under the Indian Independence Act 1947
 - c) Through an Act of Parliament in 1950
 - d) Under the Government of India Act 1935
 15. The Judges of the Supreme Court are
 - a) Elected by the Parliament.
 - b) Appointed by the President on the advice of the Parliament.
 - c) Appointed by the President on the advice of the P.M.
 - d) Appointed by the President on the advice of the Chief Justice of India.

18CPC39/49

16. The Judges of the Supreme Court after retirement are not permitted to carry on practice before
- The Supreme Court
 - The High Courts
 - The District and Session Courts
 - Any of the above
17. Which of the following Jurisdiction of the Supreme Court of India has been wrongly listed
- Original Jurisdiction
 - Appellate Jurisdiction
 - Advisory Jurisdiction
 - None of the above
18. Generally, the Governor belongs to
- The State where he is posted
 - Some other State
 - The Indian Administrative Service
 - None of the above
19. Which of the following Legislative Powers is enjoyed by the Governor of a State?
- He can summon or prorogue the State Legislature
 - He can appoint one sixth of the members of the Legislative Council.
 - He can nominate certain member of the Anglo Indian Community to the Legislative Assembly.
 - All of above powers.
20. Engineering Ethics is a
- Preventive Ethics
 - Developing
 - Natural Ethics
 - Scientifically developed Ethics.
21. Professional Ethics is
- Set of Rules relating to personal character of Professionals
 - Traditional Rules observed since a long time.
 - Set of Rules passed by Professional bodies.
 - Set of standards adopted by Professionals.
22. Tight couple means
- Binding two beams tightly
 - Erecting two pillars side by side
 - Process tightly coupled
 - Strong adhesive material
23. An Engineer may not be held legally liable or causing harm. When the harm is caused
- Intentionally
 - Ignorantly
 - Negligently
 - Recklessly
24. A compound measure of the probability and magnitude of the adverse effect is known as.
- Risk
 - Benefit
 - Compensation
 - Both (b) and (c)
25. Engineers shall issue public statements only
- In subjective manner
 - In objective manner
 - On their personal responsibility
 - Based on the reports sent by higher Officers.
26. Attackers commonly target _____ for fetching IP address of a target or victim user.
- Website
 - Web pages
 - IP tracker
 - Emails
27. _____ is the first phase of Ethical hacking
- DNS Poisoning
 - Foot printing
 - ARP – Poisoning
 - Enumeration

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18CPC39/49

28. Which of the following do not comes under the intangible skills of hackers?
- Creative thinking
 - Problem solving capability
 - Persistence
 - Smart attacking potential
29. Why programming language is important for ethical hackers and Security Professionals?
- Only to write malware.
 - For solving problems and building tool and programs
 - To teach programming
 - To develop program to harm others.
30. Understanding of _____ is also important for gaining access to a system through networks.
- OS
 - Email servers
 - Networking
 - Hardware
31. The Constitution of India was enacted by a Constituent Assembly set up
- Under the Cabinet Mission Plan 1946
 - Under the Indian Independence Act 1947
 - Under a resolution of the Provisional Government.
 - By the Indian National Congress.
32. The Members of the Constituent Assembly are
- Directly elected by the people
 - Nominated by various Political Parties
 - Nominated by rulers of the Indian States
 - Elected by the Provincial Assemblies
33. The Federal feature of the Indian Constitution provides for
- Distribution of Legislative powers between the Union Government and the State Government.
 - Division of powers between the Executive and Judiciary.
 - Distribution of powers between the P.M and Cabinet.
 - None of these
34. The Governor of State is
- Directly Elected by the people
 - Elected by the State Legislature
 - Appointed by the President
 - Nominated by the Parliament.
35. The source of Authority of the Indian Constitution is
- The Government of India
 - The People of India
 - The President
 - The Parliament
36. The Preamble was amended by
- 24th Amendment
 - 42nd Amendment
 - 39th Amendment
 - None of the above
37. Fraternity means
- Spirit of brotherhood
 - Fatherly treatment
 - Unity and integrity
 - Elimination of Economic Justice
38. In the final form of the Constitution adopted by the Constituent Assembly, how many Articles and Schedules were there?
- 397 Articles and 7 Schedules
 - 395 Articles and 4 Schedules
 - 400 Articles and 10 Schedules
 - 395 Articles and 8 Schedules

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- 39. The Preamble of the Indian Constitution does not contain concept of
 - a) Democratic
 - b) Adult Franchise
 - c) Sovereignty
 - d) Fraternity
- 40. The strength of the Constituent Assembly, after the withdrawal of the Muslim League, was reduced to
 - a) 299 members
 - b) 329 member
 - c) 331 members
 - d) 359 members
- 41. The Fundamental Rights of a Citizen can be suspended
 - a) By the Parliament through a Law enacted by two – third majority
 - b) By the President during a National emergency
 - c) By the Supreme Court
 - d) None of these
- 42. Which authority can a Citizen approach for securing Right of Personal freedom
 - a) The Parliament
 - b) The President
 - c) Supreme Court alone
 - d) Both Supreme Court and High Court
- 43. The main objective of the Fundamental Rights is to
 - a) Ensure Independence of Judiciary
 - b) Promote a Socialist Pattern of Society
 - c) Ensure Individual liberty
 - d) Ensure all the above
- 44. Under which section of IT Act, stealing any digital asset or information is written a cyber crime
 - a) 65
 - b) 65 - D
 - c) 67
 - d) 70
- 45. Fundamental duties of the Indian Citizen, were
 - a) Enshrined in the original Constitution
 - b) Added to the Constitution by the 42nd Amendment.
 - c) Added to the Constitution by the 44th Amendment.
 - d) Added to the Constitution in the wake the Supreme Court Judgment Keshavnanda Bharati case with consent of all the Political parties.
- 46. Which one of the following Fundamental Right has been subject of maximum litigation since the inauguration of the Constitution?
 - a) Right to Freedom of Speech
 - b) Right to Constitutional Remedies
 - c) Right to Property
 - d) Right against Exploitation
- 47. The Fundamental Rights of Citizens were
 - a) Incorporated in the original Constitution
 - b) Outlined in an Act of Parliament in 1952
 - c) Incorporated by the 42nd Amendment
 - d) Incorporated by the 44th Amendment
- 48. The Fundamental Rights of Indian Citizen have been criticized on the ground that
 - a) They are hemmed in by too many restrictions.
 - b) They are hemmed in languages beyond the comprehension of ordinary citizen
 - c) They are absolute
 - d) Both (a) and (b).
- 49. Respite means
 - a) Death due to drowning
 - b) Awarding lesser punishment
 - c) Death due to strangulation
 - d) Painless death
- 50. The Governor recommends the imposition of President's rule in the State
 - a) On the recommendation of the State Legislature
 - b) On the recommendation of the C.M.
 - c) On the recommendation of Council of Minister
 - d) If he is satisfied that the State Government cannot be carried on his accordance with the provision of the Constitution.
- 51. Who of the following acted as the Constitutional Advisor of the Constituent Assembly
 - a) Dr. B.R. Ambedkar
 - b) Dr. Babu Rajendra Prasad
 - c) B.N. Rao
 - d) Dr. Sachidanand Sinha
- 52. Which one of the following provisions of the Constitution came into force soon after its adoption on 26th November 1949?
 - a) Provision relating to Citizenship
 - b) Elections
 - c) Provisional Parliament
 - d) All the above
- 53. The three types of Justice referred in our Preamble are
 - a) Social, Economic and Social
 - b) Economic, International and Political
 - c) Economic, Religious and Social
 - d) Religious, Social and Political
- 54. What was the exact Constitutional status of the Indian Republic on January 26, 1950, when the Constitution was inaugurated?
 - a) A Democratic Republic
 - b) Sovereign Democratic Republic
 - c) A Sovereign Secular Democratic Republic
 - d) A Sovereign Socialist Secular Democratic Republic.
- 55. Right to against Exploitation seeks to protect the weaker sections of Society by
 - a) Giving equal pay for equal work for men and women.
 - b) Prohibiting human trafficking and beggar
 - c) Providing compulsory education for children below the age of 14 years
 - d) Forcing a person to work against his will without payment
- 56. Which one of the following Directive principles can be described as Gandhian in nature?
 - a) Providing equal pay for equal work for both Men and Women
 - b) Workers participation in Management
 - c) Organization of Village Panchayats as units of self Government
 - d) Separation of Judiciary from the Executive.
- 57. Who has been vested with the power to decide whether the restrictions imposed on the Fundamental Rights of Indian Citizen are reasonable or not
 - a) The Parliament
 - b) The President
 - c) The Courts
 - d) None of the above
- 58. Which one of the following Rights conferred by the Constitution is also available to Noncitizens.
 - a) Freedom of speech assembly and association
 - b) Freedom to move, reside and settle in any part of the territory of India
 - c) Freedom to acquire property or to carry on any occupation, trade or business
 - d) Right to Constitutional remedies.
- 59. Which one of the following has been wrongly listed as a special feature of Fundamental Rights in India
 - a) Fundamental Rights are more sacrosanct than rights granted by ordinary laws
 - b) Fundamental Rights are subject to reasonable restrictions
 - c) Fundamental Rights are Justifiable and can be enforced through the Supreme Court
 - d) None of these.

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60. The main objective of the Cultural and Educational Rights granted to the Citizen is
 a) To preserve the rich culture heritage of India.
 b) To evolve a single integrated India culture.
 c) To help the minorities to conserve their culture.
 d) All the above.
61. For hacking a database or accessing and manipulating data which of the following language the hacker must know?
 a) SQL
 b) HTML
 c) TCL
 d) F #
62. _____ are piece of programs or scripts that allow hackers to take control over any system.
 a) Exploits
 b) Antivirus
 c) Firewall bypassers
 d) Worms
63. The process of finding vulnerabilities and exploiting them using exploitable scripts or programs are known as
 a) Infiltrating
 b) Exploitation
 c) Cracking
 d) Hacking
64. How many types of exploits are there based on their nature from hacking perspective?
 a) 04
 b) 03
 c) 02
 d) 05
65. A _____ is a set of changes done to any program or its associated data designed for updating fixing or improving it.
 a) Scratch
 b) Patch
 c) Fixer
 d) Resolver
66. Fixing of security vulnerabilities in a system by additional programs is known as _____ patches
 a) Hacking
 b) Database
 c) Server
 d) Security
67. _____ are some very frequent updates that come for every antivirus.
 a) Patch update
 b) Data update
 c) Code update
 d) Definition update
68. Cyber – Crime can be categorized into _____ types.
 a) 04
 b) 03
 c) 02
 d) 06
69. Which of the following is not a type of peer to peer cyber – crime.
 a) Phishing
 b) Injecting Trojan to a target victim
 c) MITM
 d) Credit card details leak in deep web
70. In which year India's IT Act came into existence?
 a) 2000
 b) 2001
 c) 2002
 d) 2003
71. The Chief Election Commissioner can be removed from his office before the expiry of term by the
 a) Chief Justice of India
 b) Prime Minister on the recommendation of Cabinet
 c) President on the recommendation of Parliament after the impeachment
 d) President on the advice of Chief Justice of India.
72. The quorum of minimum number of members required to hold the meetings of either houses of Parliament is
 a) One - tenth
 b) One - fifth
 c) One - third
 d) 72 hours

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73. The advice of the Supreme Court is
 a) Binding of the President
 b) Binding on the President if it is tendered unanimously
 c) Not binding on the President
 d) Binding in certain cases and not binding in other cases
74. The Governor reserves the Right to issue ordinances
 a) When the State Legislature is not in session and he feels that there is an immediate need of action
 b) Whenever the State is under President's Rule
 c) Whenever he likes
 d) None of these
75. The Writ of Certiorari is issued by a Superior Court
 a) To an Inferior Court to stop further proceedings in a particular case
 b) To an Inferior Court to transfer the record of proceedings in a case for its review
 c) To an Office to show his right to hold a particular Office
 d) To a Public authority to produce a person detained by it before the Court within 24 hours.
76. Which one of the following was wrongly listed as a duty of Indian Citizens
 a) To uphold and protect the Sovereign unity and integrity of the Country
 b) To promote harmony and the spirit of common brotherhood among the people of India
 c) To protect and pressure the Natural Environment
 d) To practice Family planning and control population.
77. The Directive Principles Aim at
 a) Ensuring Individual liberty
 b) Ensuring strengthening of the Country's Independence
 c) Providing a social and economic base for a genuine democracy in the Country.
 d) Achieving all the above objectives.
78. The Directive Principles are the
 a) Positive instructions to the Government to work for the attainment of the set objectives
 b) Negative injunctions to the Government to refrain from encroaching on the freedom of the people.
 c) Directive to the State to enhance the International prestige of the Country
 d) Directives to the Government to pursue a policy of non alignment.
79. Which one of the following has been wrongly listed as Directive Principle based on 'Liberal Principles.'
 a) Separation of Judiciary and Executive
 b) Provision of a Uniform Civil code for the Country
 c) Protection of monuments and places of artistic or Historical importance
 d) None of the above has been wrongly listed.
80. The Constitution has vested the Executive power of the Union Government in
 a) The President of India
 b) The Prime Minister
 c) The Council of Minister
 d) All the above
81. Cooking Means
 a) Boiling under pressure
 b) Retaining results which fit theory
 c) Making deceptive statements
 d) Misleading the Public about quality of the product.

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- 82. Which one is not a Trade Secret?
a) Theorem b) Equipment c) Formulae d) Pattern
- 83. The codes of Ethics can be taken as guidelines by the Engineers to
a) Resolve the conflicts b) Formulate problems
c) Overcome the work pressure d) Escape from the responsibility
- 84. A Fault tree is used to
a) Assess the risk involved b) Claim compensation
c) Take free consent d) Improve safety
- 85. Risk of harm equal to probability of producing benefit is
a) Inevitable Risk b) Acceptable Risk
c) Risk which cannot be avoided d) None of these
- 86. One of the Aims of studying Engineering Ethics is to
a) Inspire Engineers to acquire in depth knowledge in their field
b) Acquire new skills in Engineering testing
c) Stimulate moral imaginations
d) Make Engineers self – confident in discharging their duties.
- 87. Which one is not an impediment to responsibility?
a) Group think b) Microscopic vision
c) Trademark d) Egocentric tendencies
- 88. Being safe or blaming others is type of attitude of responsibility of Engineers
a) Minimalist b) Reasonable care c) Good works d) None of these
- 89. To overcome an impediment 'Unethical Acceptance', what step an Engineer has to take?
a) Accept and Analyse b) Analyse and Accept
c) Always say Yes Boss d) None of these
- 90. Engineering Ethics,
a) Stimulates the moral imagination
b) Provides up – to – date knowledge in the field of Engineering.
c) Stimulates to Conduct Research d) Stresses on Time Management.
- 91. Impeachment proceedings can be initiated against the President in either House of Parliament only if a resolution signed by members of the House is moved.
a) 10 percent of total b) 25 percent of total
c) 20 percent of total d) 15 percent of total
- 92. Which one of the following functions of Prime – Minister has been wrongly listed?
a) He presides over the meeting of the Cabinet
b) He prepares the agenda for the meeting of the Cabinet
c) He coordinates the working of various departments
d) He chairs the meeting of the various standing and ad-hoc committees of Parliament.
- 93. A motion of no – confidence against the Council Ministers can be moved in the Lok – Sabha, if it is supported by atleast
a) 50 members b) 55 members
c) 100 members
d) One – third of the total members of Lok – Sabha
- 94. The President can call a Joint session of the two Houses of Parliament
a) If a bill passed by one house is rejected by the other
b) If the amendment proposed to the bill by one house is not acceptable to the other house.
c) If the house does not take any action for six months on a bill remitted by the other house.
d) Under all the above conditions.
- 95. The Members of the Rajya – Sabha except the nominated ones are
a) Directly elected by the people b) Elected by Local Self – Governing bodies
c) Elected by the Legislative Assemblies of the States.
d) Elected partially by Legislative Assemblies and partially by the Local Self Governing bodies.
- 96. The President who is the head of the State under the Parliamentary system prevailing in India.
a) Enjoys absolute powers b) Enjoys limited but real powers
c) Enjoys only nominal powers d) Enjoys no powers
- 97. The Vice – President is the Ex – Office Chairman of
a) The Rajya Sabha b) The National Development Council
c) The Planning Commission d) None of the above
- 98. The Speaker of the Lok – Sabha is
a) Appointed by the President.
b) Appointed by the President on the recommendations of the P.M.
c) Elected by the members of the two houses at a joint sitting.
d) Elected by the members of the Lok – Sabha.
- 99. The Rajya – Sabha is a permanent House but
a) One – third of its members retire every two years
b) One – half of its members retire every three years
c) One – fifth of its members retire every year
d) One – half of its members retire every two years.
- 100. The power to control the expenditure of the Government of India rests exclusively with
a) The Parliament b) The President
c) The Comptroller and Auditor General d) The Union Finance Minister

CBCS SCHEME

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18MAT31

Third Semester B.E. Degree Examination, Feb./Mar. 2022 Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Evaluate (i) $L\left\{\frac{\cos 2t - \cos 3t}{t}\right\}$ (ii) $L(t^2 e^{-3t} \sin 2t)$ (06 Marks)
- b. If $f(t) = \begin{cases} t, & 0 \leq t \leq a \\ 2a - t, & a \leq t \leq 2a \end{cases}$, $f(t + 2a) = f(t)$ then show that $L(f(t)) = \frac{1}{s^2} \tanh\left(\frac{as}{2}\right)$ (07 Marks)
- c. Solve by using Laplace Transforms
 $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 4y = e^{-t}$, $y(0) = 0$, $y'(0) = 0$ (07 Marks)

OR

- 2 a. Evaluate $L^{-1}\left(\frac{4s+5}{(s+1)^2(s+2)}\right)$ (06 Marks)
- b. Find $L^{-1}\left(\frac{s}{(s^2+a^2)^2}\right)$ by using convolution theorem. (07 Marks)
- c. Express $f(t) = \begin{cases} \sin t, & 0 \leq t < \pi \\ \sin 2t, & \pi \leq t < 2\pi \\ \sin 3t, & t \geq 2\pi \end{cases}$
 in terms of unit step function and hence find its Laplace Transform. (07 Marks)

Module-2

- 3 a. Obtain fourier series for the function $f(x) = |x|$ in $(-\pi, \pi)$ (06 Marks)
- b. Expand $f(x) = \frac{(\pi-x)^2}{4}$ as a Fourier series in the interval $(0, 2\pi)$ and hence deduce that
 $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$ (07 Marks)
- c. Express y as a Fourier series upto the second harmonic given :

x:	0	60	120	180	240	300
y:	4	3	2	4	5	6

(07 Marks)

OR

- 4 a. Find the Half-Range sine series of $\pi x - x^2$ in the interval $(0, \pi)$ (06 Marks)
- b. Obtain fourier expansion of the function $f(x) = 2x - x^2$ in the interval $(0, 3)$. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- c. Obtain the Fourier expansion of y upto the first harmonic given :

x	0	1	2	3	4	5
y	9	18	24	28	26	20

(07 Marks)

Module-3

- 5 a. If $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$, find the Fourier transform of $f(x)$ and hence find the

value of $\int_0^{\infty} \frac{\sin x}{x} dx$

(06 Marks)

- b. Find the infinite Fourier cosine transform of e^{-ax} . (07 Marks)
 c. Solve using z-transform $y_{n+2} - 4y_n = 0$ given that $y_0 = 0, y_1 = 2$ (07 Marks)

OR

- 6 a. Find the fourier sine transform of $f(x) = e^{-|x|}$ and

hence evaluate $\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx ; m > 0$.

(06 Marks)

- b. Obtain the z-transform of $\cos n\theta$ and $\sin n\theta$. (07 Marks)
 c. Find the inverse z-transform of

$$\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$$

(07 Marks)

Module-4

- 7 a. Solve $\frac{dy}{dx} = x^3 + y$, $y(1) = 1$ using Taylor's series method considering up to fourth degree terms and find $y(1.1)$. (06 Marks)

- b. Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ compute $y(0.2)$ by taking $h = 0.2$ using Runge - Kutta method of fourth order. (07 Marks)

- c. If $\frac{dy}{dx} = 2e^x - y$, $y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.040$ and $y(0.3) = 2.090$, find $y(0.4)$ correct to 4 decimal places using Adams-Bashforth method. (07 Marks)

OR

- 8 a. Use fourth order Runge-Kutta method, to find $y(0.8)$ with $h = 0.4$, given $\frac{dy}{dx} = \sqrt{x+y}$, $y(0.4) = 0.41$ (06 Marks)

- b. Use modified Euler's method to compute $y(20.2)$ and $y(20.4)$ given that $\frac{dy}{dx} = \log_{10} \left(\frac{x}{y} \right)$ with $y(20) = 5$ Taking $h = 0.2$. (07 Marks)

- c. Apply Milne's predictor-corrector formulae to compute $y(2.0)$ given $\frac{dy}{dx} = \frac{x+y}{2}$ with

x	0.0	0.5	1.0	1.5
y	2.000	2.6360	3.5950	4.9680

(07 Marks)

Module-5

- 9 a. Using Runge-Kutta method, solve

$$\frac{d^2y}{dx^2} = x \left(\frac{dy}{dx} \right)^2 - y^2, \text{ for } x = 0.2, \text{ correct to four decimal places, using initial conditions } y(0) = 1, y'(0) = 0$$

(07 Marks)

- b. Derive Euler's equation in the standard form viz,
- $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$

(07 Marks)

- c. Find the extremal of the functional
- $\int_{x_1}^{x_2} (y^2 + y'^2 + 2ye^x) dx$

(06 Marks)

OR

- 10 a. Given the differential equation
- $2 \frac{d^2y}{dx^2} = 4x + \frac{dy}{dx}$
- and the following table of initial values:

x	1	1.1	1.2	1.3
y	2	2.2156	2.4649	2.7514
y'	2	2.3178	2.6725	2.0657

Compute y(1.4) by applying Milne's Predictor-corrector formula.

(07 Marks)

- b. Prove that geodesics of a plane surface are straight lines.

(07 Marks)

- c. On what curves can the functional
- $\int_0^1 (y'^2 + 12xy) dx$
- with
- $y(0) = 0, y(1) = 1$
- can be extremized?

(06 Marks)

CBCS SCHEME

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18MATDIP31

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find the modulus and amplitude of the complex number : $\frac{(2-3i)(2+i)^2}{1+i}$. (07 Marks)
- b. Prove that $\left(\frac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^n = \cos n\theta + i\sin n\theta$. (06 Marks)
- c. Show that the vectors $\vec{a}-2\vec{b}+3\vec{c}$, $-2\vec{a}+3\vec{b}-4\vec{c}$, $-\vec{b}+2\vec{c}$ are coplanar. (07 Marks)

OR

- 2 a. Given $\vec{a} = 2\hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = 6\hat{i} - 3\hat{j} + 2\hat{k}$. Find : i) $\vec{a} \cdot \vec{b}$ ii) $\vec{a} \times \vec{b}$ iii) $|\vec{a} \times \vec{b}|$. (07 Marks)
- b. Determine the value of λ , so that $\vec{a} = 2\hat{i} + \lambda\hat{j} - \hat{k}$, and $\vec{b} = 4\hat{i} - 2\hat{j} - 2\hat{k}$, are perpendicular. (06 Marks)
- c. Express $1 - i\sqrt{3}$ in the polar form and hence find its modulus and amplitude. (07 Marks)

Module-2

- 3 a. Using Euler's theorem, prove that $xu_x + yu_y = -3 \cot u$ where $u = \sin^{-1}\left(\frac{x^2 y^2}{x+y}\right)$. (07 Marks)
- b. Using Maclaurin's series, prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{24} + \dots$. (06 Marks)
- c. If $u = x + 3y^2$, $v = 4x^2yz$, $w = 2z^2 - xy$, evaluate $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ at the point $(1, -1, 0)$. (07 Marks)

OR

- 4 a. Obtain Maclaurin's series expansion for the function e^x upto x^4 . (07 Marks)
- b. If $u = \sin^{-1}\left[\frac{x^3 + y^3}{x+y}\right]$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 2 \tan u$. (06 Marks)
- c. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 0$. (07 Marks)

Module-3

- 5 a. A particle moves along the curve $x = (1 - t^3)$, $y = (1 + t^2)$, $z = (2t - 5)$ determine its velocity and acceleration at $t = 1$ sec. (07 Marks)
- b. If $\vec{F} = 2x^2 \hat{i} - 3yz \hat{j} + xz^2 \hat{k}$, and $\phi = 2z - x^3y$, find $\vec{F} \cdot (\nabla\phi)$ and $\vec{F} \times (\nabla\phi)$ at $(1, -1, 1)$. (06 Marks)
- c. Find the constants a, b, c so that $\vec{f} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is irrotational. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at $(1, -2, -1)$ along $\vec{a} = 2\hat{i} - \hat{j} - 2\hat{k}$ (07 Marks)
- b. Find curl \vec{f} given that $\vec{f} = xyz^2\hat{i} + xy^2z\hat{j} + x^2yz\hat{k}$. (06 Marks)
- c. If $\vec{f} = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$ and $\vec{g} = yzi + zxj + xyk$. Show that $\vec{f} \times \vec{g}$ is a solenoidal vector. (07 Marks)

Module-4

- 7 a. Obtain the reduction formula, $I_n = \int \cos^n x dx$, where n is a positive integer. (07 Marks)
- b. Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy dy dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^1 (x + y + z) dx dy dz$. (07 Marks)

OR

- 8 a. Evaluate: $\int_0^{\pi/6} \sin^6(3x) dx$. (07 Marks)
- b. Evaluate: $\int_0^{\pi} x \sin^4 x \cos^6 x dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^y xyz dx dy dz$. (07 Marks)

Module-5

- 9 a. Solve: $(2x + y + 1) dx + (x + 2y + 1) dy = 0$. (07 Marks)
- b. Solve: $(4xy + 3y^2 - x) dx + (x^2 + 2xy) dy = 0$. (06 Marks)
- c. Solve: $y(2xy + e^x) dx - e^x dy = 0$. (07 Marks)

OR

- 10 a. Solve: $(5x^4 + 3x^2y^2 - 2xy^3) dx + (2x^3y - 3x^2y^2 - 5y^4) dy = 0$. (07 Marks)
- b. Solve: $y(2xy + 1) dx - x dy = 0$. (06 Marks)
- c. Solve: $\frac{dy}{dx} + y \cot x = \cos x$. (07 Marks)

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18EE32

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Electric Circuit Analysis

Time: 3 hrs.

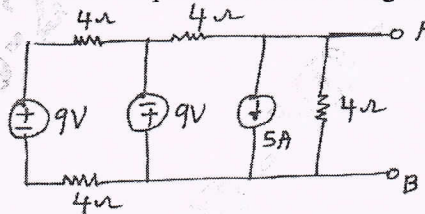
Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

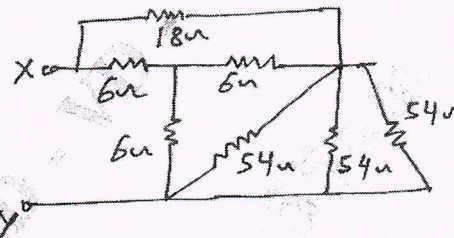
- 1 a. Use Source transformation and Source shift methods to convert the circuit shown in Fig. Q1(a) to a single current source in parallel with a single resistor. (06 Marks)

Fig. Q1(a)



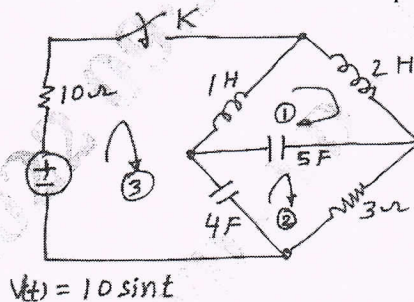
- b. Compute the resistance across the terminals XY of network, shown in Fig. Q1(b). (06 Marks)

Fig. Q1(b)



- c. For the network shown in Fig. Q1(c), write the mesh equations for the meshes indicated in time domain. Draw the dual network and write its nodal equations. (08 Marks)

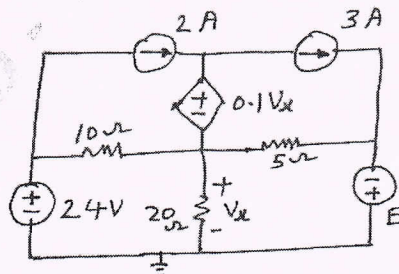
Fig. Q1(c)



OR

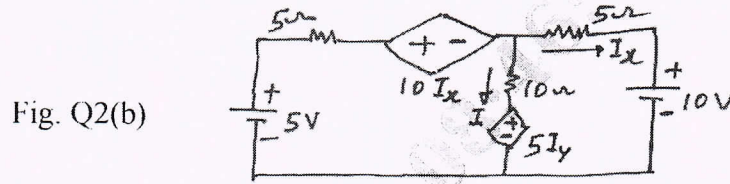
- 2 a. Use Node equations to determine what value of E will cause V_x to be zero for the circuit shown in Fig. Q2(a). (08 Marks)

Fig. Q2(a)

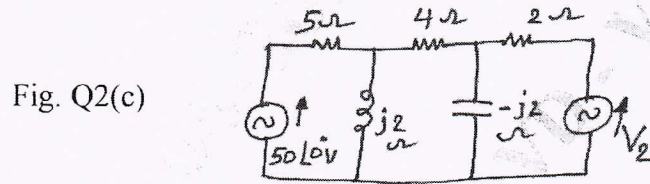


Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- b. Using Mesh analysis, find the current through 10Ω resistor in the circuit shown in Fig. Q2(b). (06 Marks)

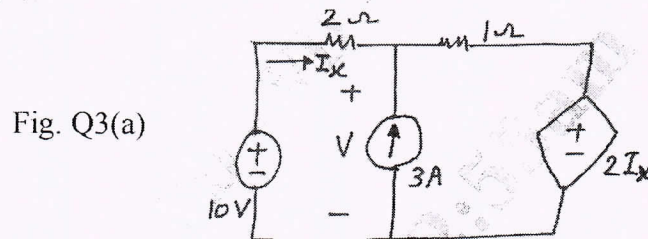


- c. In the circuit shown in Fig. Q2(c), determine V_2 which results in zero current through 4Ω resistor. Use Mesh current analysis. (06 Marks)

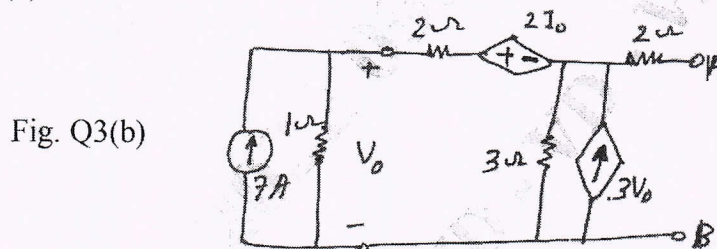


Module-2

- 3 a. Use Superposition principle to find the current in 2Ω resistor in the network shown in Fig. Q3(a). (06 Marks)



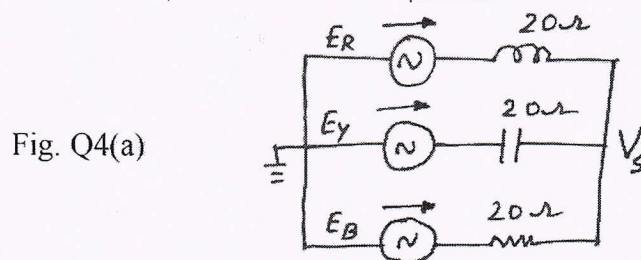
- b. Find the Thevenin and Norton equivalent circuit at terminals AB for the circuit shown in Fig. Q3(b). (10 Marks)



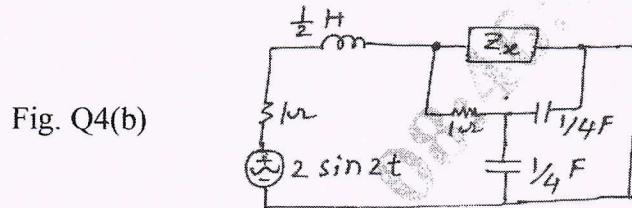
- c. State and prove maximum Power Transfer theorem as applied to DC network. (04 Marks)

OR

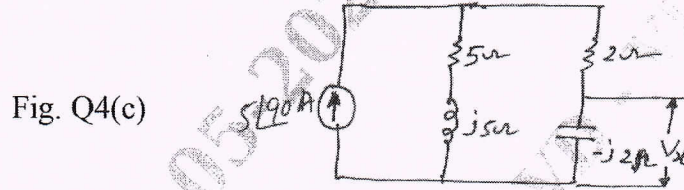
- 4 a. Use Millman's theorem to determine the voltage ' V_s ' of the network shown in Fig. Q4(a). Given that $E_R = 230 \angle 0^\circ V$; $E_Y = 230 \angle -120^\circ V$; $E_B = 230 \angle 120^\circ V$. (06 Marks)



- b. For the circuit shown in Fig. Q4(b), determine the impedance Z_X such that maximum power is transferred from the source to the load of impedance Z_X . (08 Marks)

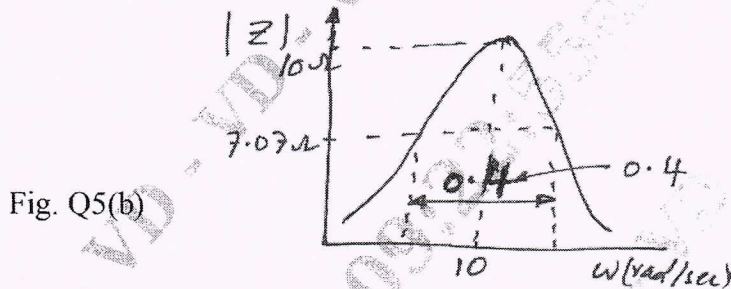


- c. Verify Reciprocity theorem for the circuit shown in Fig. Q4(c). (06 Marks)



Module-3

- 5 a. Define Q of the circuit and show that the resonant frequency is the geometric mean of half power frequencies. (07 Marks)
 b. Determine the RLC parallel circuit parameters whose impedance response curve is shown in Fig. Q5(b). What are the new values of W_r and bandwidth if 'C' is increased 4 times? (07 Marks)

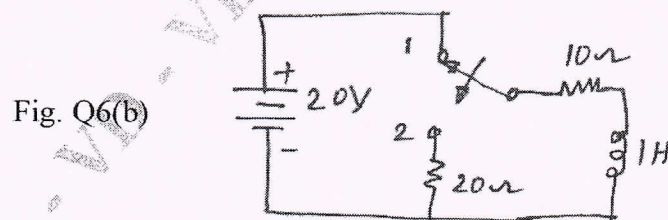


- c. A parallel R – L circuit is energized by a current source of 1A. The switch across the source is opened at $t = 0^+$. Solve for V, DV and D^2V at $t = 0^+$, if $R = 100\Omega$ and $L = 1H$. (06 Marks)

OR

- 6 a. A two branch anti resonant circuit contains $L = 0.4H$ and $C = 40\mu F$. Resonance is to be achieved by variation of R_L and R_C . Calculate the resonance frequency for the following cases : i) $R_L = 120\Omega$; $R_C = 80\Omega$ ii) $R_L = 80\Omega$; $R_C = 0$ iii) $R_L = R_C = 100\Omega$. (08 Marks)

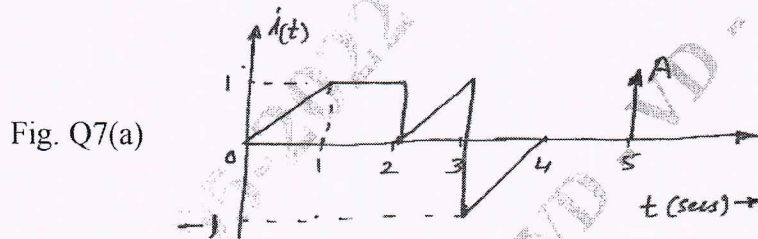
- b. Determine i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$, when the switch K is moved from position 1 to 2 at $t = 0$ in the network shown in Fig. Q6(b). Steady state having been reached before switching. (06 Marks)



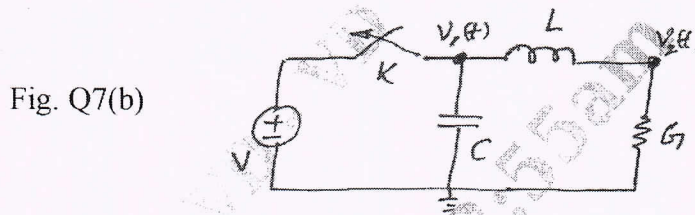
- c. Why do we need to study initial conditions? Write the equivalent form of the elements in terms of the initial and final conditions of the element. (06 Marks)

Module-4

- 7 a. The current function $i(t)$ shown in Fig. Q7(a) is impressed on a capacitor 'C'. What should be the strength 'A' of the impulse so that the voltage across the 'C' becomes zero for $t > 5$ sec. (10 Marks)

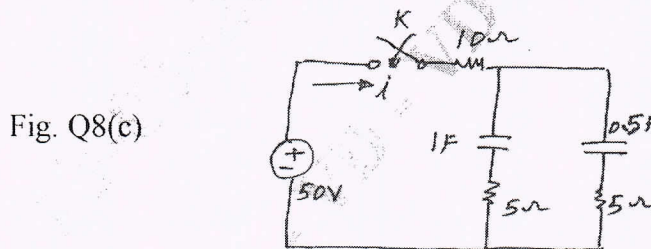


- b. In the circuit shown in Fig. Q7(b), the switch is opened at $t = 0$, with $V = 1V$, $C = 1F$, $L = \frac{1}{2}H$ and $G = 1\Omega$. Find the node voltages $V_1(t)$ and $V_2(t)$ by Laplace transform method. (10 Marks)



OR

- 8 a. State and prove Initial and Final value theorems. (08 Marks)
 b. If $f(t) = 2t$, sketch the following i) $f(t - 2)u(t)$ ii) $f(t)u(t - 2)$ iii) $f(t - 2)u(t - 2)$
 iv) $f(t)\delta(t)$ v) $f(t)\delta(t - 2)$. (06 Marks)
 c. In the circuit shown in Fig. Q8(c), the switch is closed at $t = 0$ and there is no initial charge on either of the capacitors. Find the resulting current 'i'. Using Laplace transformation. (06 Marks)



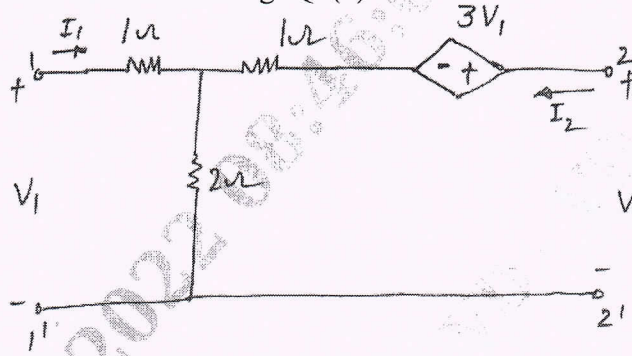
Module-5

- 9 a. A three phase, 4 – wire 150V, CBA system has a star connected load with $Z_A = 6 \angle 0^\circ \Omega$, $Z_B = 6 \angle 30^\circ \Omega$ and $Z_C = 5 \angle 45^\circ \Omega$. Obtain all the i) Line currents
 ii) Currents in the neutral iii) Hence draw the Phasor diagram. (08 Marks)
 b. Define $[Z]$ and $[Y]$ of a two port network and derive for $[Z]$ in terms of $[Y]$. (08 Marks)

c. Determine $[Z]$ for the network shown in Fig. Q9(c).

(04 Marks)

Fig. Q9(c)



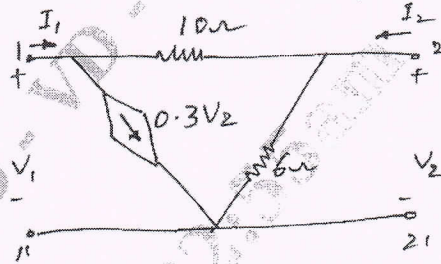
OR

10 a. A three phase, 339.4V, ABC system has a delta connected load with $Z_{AB} = 10 \angle 0^\circ \Omega$, $Z_{BC} = 10 \angle 30^\circ \Omega$ and $Z_{CA} = 15 \angle -30^\circ \Omega$. Obtain phase and line currents as well as draw the phasor diagram. Assume V_{BC} as a reference phasor.

(10 Marks)

b. Obtain $[Z]$ and $[Y]$ for the two port network shown in Fig. Q10(b).

Fig. Q10(b)



(10 Marks)

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18EE33

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Transformers and Generators

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With the help of phasor diagram, explain the operation of practical transformer on load. (06 Marks)
- b. Find the all day efficiency of single phase transformer having a maximum efficiency of 98% at 15KVA, UPF and loaded as follows:
 12 hours → 2kW, 0.5pf lagging
 6 hours → 2kW, 0.8pf lagging
 6 hours → no load. (08 Marks)
- c. Explain with neat circuit diagram and phasor diagram the operation of star-star connected 3 phase transformer. (06 Marks)

OR

- 2 a. Explain with the help of connection and phasor diagram how SCOTT connections are used to obtain two phase from three phase supply. (06 Marks)
- b. A 5KVA, 500/250V, 50Hz single phase transformer gave the following readings,
 OC test : 500V, 1A, 50W [LV side open]
 SC test : 25V, 10A, 60W [LV side shorted]
 Determine:
 i) Efficiency on full load and 0.8pf lagging.
 ii) Voltage regulation on full load and 0.8pf leading.
 iii) Efficiency on 60% of full load and 0.8pf leading.
 iv) Draw the equivalent circuit referred to primary and insert all values in it. (10 Marks)
- c. Mention the advantages of delta-delta connected 3 phase transformer [Any four]. (04 Marks)

Module-2

- 3 a. With a neat circuit diagram, explain Sumpner's test conducted on two identical transformers. Also show how efficiency and regulation are calculated from Sumpner's test data. (08 Marks)
- b. Why parallel operation two single phase transformers are needed and mention the necessary conditions to be satisfied for parallel operation. (06 Marks)
- c. With a neat diagram, explain the operation of on-load tap changer. (06 Marks)

OR

- 4 a. With a neat diagram show the current distribution in step up and step down Auto transformer. Also derive the expression for saving of copper in an Auto transformer. (10 Marks)
- b. Obtain the expression for load sharing during the parallel operation of two transformers having same voltage ratios. (06 Marks)
- c. Explain how the Eddy current losses and hysteresis losses are separated in a single phase transformer. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Explain how the equivalent circuit parameters are obtained for a three winding transformers. (08 Marks)
- b. What is armature reaction in DC machines? Explain how armature reaction produces demagnetizing and cross magnetizing effect. Also derive the necessary expressions for demagnetizing and cross magnetizing ampere turns. (08 Marks)
- c. Write short notes on concentrated and distributed winding in a synchronous generator. (04 Marks)

OR

- 6 a. Derive the Emf equation of an alternator. Also derive an expression for pitch factor and distribution factor. (10 Marks)
- b. What is commutation? With a neat diagram, explain the process of commutation. (06 Marks)
- c. Mention reasons for using three winding transformers. (04 Marks)

Module-4

- 7 a. Explain the method of determining voltage regulation of synchronous generator by ZPF method with all the circuit diagram necessary in the test. (12 Marks)
- b. The OC and SC test readings for a 3 ϕ star connected 1000KVA, 2000V, 50Hz alternator are

I_f	10	20	25	30	40	50
V_{OC} line voltage	800	1500	1760	2000	2350	2600
I_{asc}	-	200	250	300	-	-

The armature resistance is $0.2\Omega/ph$. Draw the characteristic curves and estimate the percentage regulation by EMF method at i) FL, 0.8pf lag ii) FL, 0.8pf lead. (08 Marks)

OR

- 8 a. Explain the method of determining voltage regulation of alternator by MMF method with all necessary circuit diagrams in the test. (12 Marks)
- b. Derive the expression for EMF induced in terms of terminal voltage, load current, armature resistance, synchronous reactance along with phasor diagram for lagging and leading PF load. (08 Marks)

Module-5

- 9 a. Mention the necessary conditions for synchronization of alternators. Explain the lamp dark and lamp bright method of synchronization of alternators. (12 Marks)
- b. Write short notes on hunting in synchronous machine. Also explain the role of damper windings. (08 Marks)

OR

- 10 a. With a neat circuit diagram, explain the method of determination of X_d and X_q of salient pole alternators. (10 Marks)
- b. Write short notes on capability curves of a synchronous generators. (06 Marks)
- c. Mention any four advantages of operating alternators in parallel. (04 Marks)

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18EE34

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Analog Electronic Circuits

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. For the circuit shown in Fig Q1(a) sketch the output waveforms and transfer characteristics for cut in voltage of diode is 0.7V

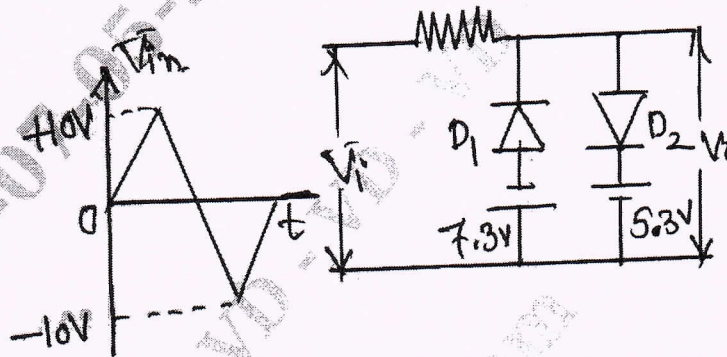


Fig Q1(a)

(08 Marks)

- b. With a neat circuit diagram, explain self bias circuit, write the necessary equations. (08 Marks)
- c. Define stability factor and derive the expression for stability factor of fixed base circuit with respect to I_{CO} . (04 Marks)

OR

- 2 a. Derive an expression for E_{TH} , I_B and V_{CE} for voltage divider bias circuit using exact analysis. (08 Marks)
- b. What is clamping circuit? Explain the negative clamping circuit with and without reference voltage with necessary waveforms. (08 Marks)
- c. List the important applications of clipping and clamping circuits. (04 Marks)

Module-2

- 3 a. With the help of r_e equivalent model, derive an equation for Z_i , Z_o and A_V for an emitter follower configuration. (08 Marks)
- b. State and prove Millers theorem. (08 Marks)
- c. Compare the characteristics of CB, CC and CE configurations. (04 Marks)

OR

- 4 a. Starting from fundamental define h-parameters and obtain an h-parameter equivalent circuit of common emitter configuration. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- b. For the circuit shown below, determine : i) r_e ii) Z_i, Z_o, A_v and A_i taking $r_o = \infty \Omega$

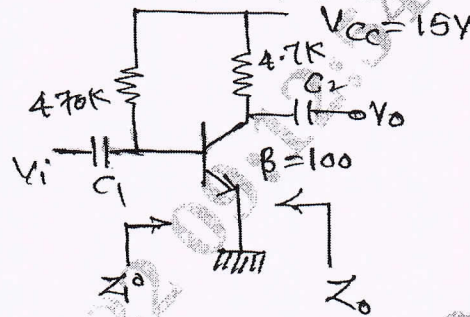


Fig Q4(b)

- c. What are the advantages of h-parameters?

(08 Marks)
(04 Marks)

Module-3

- 5 a. Derive expressions for Z_i, Z_o and A_i for a Darlington emitter follower circuit. (10 Marks)
b. Draw and explain the block diagram of multistage cascade amplifier. (06 Marks)
c. Write important characteristics of Darlington emitter follower. (04 Marks)

OR

- 6 a. For a current series feedback amplifier, derive an expression for Z_{if} and Z_{of} . (10 Marks)
b. Explain the general characteristics of negative feedback amplifier. (10 Marks)

Module-4

- 7 a. Explain the operation of class B push-pull amplifier. Prove that the maximum efficiency of class B configuration is 78.5%. (08 Marks)
b. With a neat diagram and waveform, explain the operation of RC phase shift oscillator using BJT. Write the expression for frequency of oscillation. (08 Marks)
c. A crystal has following parameters $L = 0.3344H, C = 0.065pF, C_M = 1pF$ and $R = 5.5K\Omega$. Calculate : i) Series resonance frequency ii) Parallel resonance frequency. (04 Marks)

OR

- 8 a. With a neat diagram, explain basic principle of operation of oscillators and write the condition to obtain sustained oscillations. (08 Marks)
b. Prove that the maximum conversion efficiency of class A transformer coupled amplifier is 50%. (08 Marks)
c. The following readings are available for a power amplifier, calculate the second harmonic distortion in each case.

$$V_{CEQ} = 10V \quad V_{CE(max)} = 18V \quad V_{CE(min)} = 1V$$

$$V_{CEQ} = 10V \quad V_{CE(max)} = 19V \quad V_{CE(min)} = 1V$$

(04 Marks)

Module-5

- 9 a. Explain the construction working and characteristics of an n-channel JFET. (10 Marks)
b. Define transconductance (g_m) and derive an expression for " g_m ". (06 Marks)
c. Compare BJT and JFET. (04 Marks)

OR

- 10 a. With neat sketch, explain the basic construction operation and characteristic of n-channel depletion type MOSFET. (10 Marks)
b. Derive the expression for A_v, Z_i and Z_o for a JFET common source amplifier with fixed bias configuration. (10 Marks)

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18EE35

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Digital System Design

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the definition of combinational logic. Convert the given Boolean expression into minterm canonical form and maxterm canonical form.

$$F(x, y, z) = X + \bar{x} \bar{z}(y + z)$$
 (08 Marks)
 - b. Simplify the function :

$$Y = f(a, b, c, d) = \sum m(2, 3, 4, 5, 13, 15) + \sum d(8, 9, 10, 11)$$
 using Karnaugh map. (06 Marks)
 - c. Simplify the function :

$$Y = f(a, b, c, d) = \pi M(0, 4, 5, 7, 8, 9, 11, 12, 13, 15)$$
 using the Karnaugh map. (06 Marks)

OR

- 2 a. Simplify wing the Quine – McClusky minimization technique :

$$Y = f(a, b, c, d) = \sum m(0, 2, 8, 10)$$
 (08 Marks)
 - b. Using the Quine – McCluskey method, obtain all the prime impicates for the following Boolean function :

$$f(a, b, c, d) = \pi M(0, 2, 3, 4, 5, 12, 13) + dc(8, 10)$$
 (12 Marks)

Module-2

- 3 a. With the aid of general structure, clearly distinguish between a decoder and encoder. (06 Marks)
 - b. Implement the following Boolean function using 4 : 1 multiplexer.

$$F(A, B, C) = \sum m(1, 3, 5, 6)$$
 (06 Marks)
 - c. Implement full subtractor using a decoder and two NAND gates and write its truth table. (08 Marks)

OR

- 4 a. What is carry look ahead adder? Explain general organization of it. (06 Marks)
 - b. Write a truth table for two – bit magnitude comparator. Write the Karnaugh map for each output of two bit magnitude comparator and the resulting equation. (14 Marks)

Module-3

- 5 a. What is a Flip-Flop? Discuss the working principle of SR Flip Flop with its truth table. Also high light the role of SR Flip Flop in switch debouncer circuit. (12 Marks)
 - b. Explain the operation of Master - Slave JK flip-flop along with its circuit diagram. (08 Marks)

OR

- 6 a. Draw and explain the working of Positive and Negative edge triggered D flip-flop. (12 Marks)
 - b. Derive the characteristic equations for D, JK, T and SR flip flops. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Explain with suitable logic and timing diagram :
 i) Serial-in serial-out shift register
 ii) Parallel-in parallel out shift register. **(10 Marks)**
 b. Compare Registers and Counters. Explain the working of 4-bit Asynchronous counter using JK flip-flops. **(10 Marks)**

OR

- 8 a. Describe the block diagram of a MOD – 7 Johnson counter and explain its operation. Give the count sequence table and the decoding logic used to identify the various states. **(10 Marks)**
 b. Design a MOD – 5 synchronous binary counter using clocked J-K flip-flops. **(10 Marks)**

Module-5

- 9 a. With a suitable example, explain Mealy and Moore model in a sequential circuit analysis. **(08 Marks)**
 b. A sequential circuit has one input and one output. The state diagram is as shown in Fig.Q9(b). Design a sequential circuit with 'T' flip-flop.

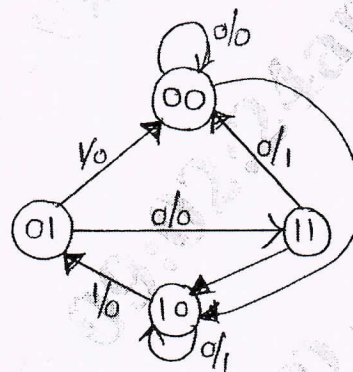


Fig.Q9(b)

(12 Marks)

OR

- 10 a. With a basic structure, explain clearly Programmable Read Only Memories (PROMS) and EPROM. **(13 Marks)**
 b. Write short note on :
 i) Read only and Read/Write memories
 ii) Flash memory. **(07 Marks)**

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18EE36

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Electrical and Electronic Measurements

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Analyze unbalanced operation of Wheatstone bridge and derive bridge sensitivity. (08 Marks)
 b. Obtain the balance equation for Hay's bridge used for the measurement of inductance. Draw the phasor diagram at the balanced condition. (07 Marks)
 c. A Kelvin double bridge is balanced with the following constants, outer ratio arms 100Ω and 1000Ω , inner ratio arms 99.92Ω and 1000.6Ω . Resistance of the link 0.1Ω . Standard resistance 0.00377Ω . Calculate the unknown resistance. (05 Marks)

OR

- 2 a. With diagram explain how Megger can be used for measurement of very high resistance. (08 Marks)
 b. Obtain the balance equation for Schering bridge used for the measurement of capacitance. (06 Marks)
 c. The four arms of the Maxwell's capacitance bridge at balance are :
 Arm ab : unknown inductance L_1 having an internal resistance R_1
 Arm bc : A non-inductive resistance of 1000Ω
 Arm cd : A capacitor of $0.5 \mu F$ in parallel with a resistance of 1000Ω
 Arm da : A resistance of 1000Ω
 Determine the values of R_1 and L_1 . (06 Marks)

Module-2

- 3 a. Show that deflecting torque $T_d = VI \cos \phi$ for UPF Wattmeter. (07 Marks)
 b. With a neat sketch explain the construction and working of a single phase dynamometer type power factor meter. (07 Marks)
 c. The constant of energy meter is 750 revolutions per kwhr. Calculate the number of revolutions made by it, when connected to a load carrying 100A at 230V and 0.8 power factor in 30 seconds. If it makes 110 revolutions in 30 seconds, find the percentage error. (06 Marks)

OR

- 4 a. With circuit and phasor diagram explain the theory and operation of single phase induction type energy meter. (10 Marks)
 b. What is creeping in energy meter? How it is prevented? (04 Marks)
 c. Explain how reactive power can be measured with single wattmeter in a three phase circuit. (06 Marks)

Module-3

- 5 a. What is Shunt? How it is used to extend the range of an ammeter. (04 Marks)
 b. Write the equivalent circuit and vector diagram of a current transformer. Give the expression for its ratio and phase angle error. (08 Marks)
 c. With circuit diagram, explain the measurement of fluxdensity inside a ring specimen of magnetic material. (08 Marks)

OR

- 6 a. Explain why magnetic measurement in Ferro – magnetic material is important. (03 Marks)
b. Explain the theory and operation of the comparative deflection method of testing a CT by Silsbee's method. (10 Marks)
c. A potential transformer of ratio 1000/100V has the following constants $r_p = 95\Omega$, $R_p = 0.9\Omega$, $x_p = 68\Omega$, $x_p = 120\Omega$, $I_0 = 0.02A$ at a power factor of 0.4. calculate :
i) Phase angle error at no-load
ii) Load in VA at Upf at which the phase angle will be zero. (07 Marks)

Module-4

- 7 a. What are the essentials of an electronic instrument and explain. (05 Marks)
b. With block diagram explain the working of true RMS recording voltmeter. (07 Marks)
c. With circuit, explain the principle of operation of electronic multimeter. (08 Marks)

OR

- 8 a. Mention the advantages of electronic instruments. (04 Marks)
b. Explain with block diagram the dual slope integrating type digital voltmeter. (08 Marks)
c. What is the working principle of Q-meter? With circuit, explain how Q-factor and inductance of an unknown coil be measured using Q-meter. (08 Marks)

Module-5

- 9 a. Explain :
i) Segmental display
ii) Dot matrix display. (06 Marks)
b. Explain the operation of LED display. Mention its advantages. (08 Marks)
c. With a basic circuit, explain the operation of potentiometric recorder. (06 Marks)

OR

- 10 a. With schematic, explain the operation of gas discharge plasma display. (06 Marks)
b. With the help of neat block diagram, explain the operation of ECG machine. (08 Marks)
c. Explain the operation of LVDT type recorder. (06 Marks)

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Question Paper Version : B

Third/Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Constitution of India, Professional Ethics and Cyber Law

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the hundred questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners on the OMR sheets are strictly prohibited.**

1. Which one of the following does not take part in the Election of the President?
 - a) Elected Members of Lok - Sabha
 - b) Elected Members of Rajya - Sabha
 - c) Members of the Legislative Council
 - d) None of these
2. The President can be removed by impeachment procedure on the ground of violating the Constitution by
 - a) The Supreme Court
 - b) The Lok - Sabha only
 - c) Both Houses of Parliament
 - d) The High Court
3. The Vice - President of India is Elected by the
 - a) People
 - b) Members of State - Legislative Assembly
 - c) Members of the Rajya - Sabha
 - d) Members of both the Houses of Parliament at Joint sitting.
4. Who discharges the duties of the President in the event of President and Vice - President being not available?
 - a) The Prime Minister
 - b) The Chief Justice of India
 - c) The Speaker of Lok - Sabha
 - d) The Attorney General of India
5. Which one of the following can the President of India declare?
 - a) Emergency due to threat of War, external aggression or armed rebellion
 - b) Emergency due to breakdown of constitutional machinery in the State
 - c) Financial emergency on account of threat to the financial credit of India
 - d) All the above.
6. Which budget is placed first in the Parliament House
 - a) Railway
 - b) General budget
 - c) Financial
 - d) Vote of credit

VER - B - 1 of 10

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16. The Judges of the Supreme Court after retirement are not permitted to carry on practice before
- The Supreme Court
 - The High Courts
 - The District and Session Courts
 - Any of the above
17. Which of the following Jurisdiction of the Supreme Court of India has been wrongly listed
- Original Jurisdiction
 - Appellate Jurisdiction
 - Advisory Jurisdiction
 - None of the above
18. Generally, the Governor belongs to
- The State where he is posted
 - Some other State
 - The Indian Administrative Service
 - None of the above
19. Which of the following Legislative Powers is enjoyed by the Governor of a State?
- He can summon or prorogue the State Legislature
 - He can appoint one sixth of the members of the Legislative Council.
 - He can nominate certain member of the Anglo Indian Community to the Legislative Assembly.
 - All of above powers.
20. Engineering Ethics is a
- Preventive Ethics
 - Developing
 - Natural Ethics
 - Scientifically developed Ethics.
21. Professional Ethics is
- Set of Rules relating to personal character of Professionals
 - Traditional Rules observed since a long time.
 - Set of Rules passed by Professional bodies.
 - Set of standards adopted by Professionals.
22. Tight couple means
- Binding two beams tightly
 - Erecting two pillars side by side
 - Process tightly coupled
 - Strong adhesive material
23. An Engineer may not be held legally liable or causing harm. When the harm is caused
- Intentionally
 - Ignorantly
 - Negligently
 - Recklessly
24. A compound measure of the probability and magnitude of the adverse effect is known as.
- Risk
 - Benefit
 - Compensation
 - Both (b) and (c)
25. Engineers shall issue public statements only
- In subjective manner
 - In objective manner
 - On their personal responsibility
 - Based on the reports sent by higher Officers.
26. Attackers commonly target _____ for fetching IP address of a target or victim user.
- Website
 - Web pages
 - IP tracker
 - Emails
27. _____ is the first phase of Ethical hacking
- DNS Poisoning
 - Foot printing
 - ARP – Poisoning
 - Enumeration

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28. Which of the following do not comes under the intangible skills of hackers?
- Creative thinking
 - Problem solving capability
 - Persistence
 - Smart attacking potential
29. Why programming language is important for ethical hackers and Security Professionals?
- Only to write malware.
 - For solving problems and building tool and programs
 - To teach programming
 - To develop program to harm others.
30. Understanding of _____ is also important for gaining access to a system through networks.
- OS
 - Email servers
 - Networking
 - Hardware
31. The Constitution of India was enacted by a Constituent Assembly set up
- Under the Cabinet Mission Plan 1946
 - Under the Indian Independence Act 1947
 - Under a resolution of the Provisional Government.
 - By the Indian National Congress.
32. The Members of the Constituent Assembly are
- Directly elected by the people
 - Nominated by various Political Parties
 - Nominated by rulers of the Indian States
 - Elected by the Provincial Assemblies
33. The Federal feature of the Indian Constitution provides for
- Distribution of Legislative powers between the Union Government and the State Government.
 - Division of powers between the Executive and Judiciary.
 - Distribution of powers between the P.M and Cabinet.
 - None of these
34. The Governor of State is
- Directly Elected by the people
 - Elected by the State Legislature
 - Appointed by the President
 - Nominated by the Parliament.
35. The source of Authority of the Indian Constitution is
- The Government of India
 - The People of India
 - The President
 - The Parliament
36. The Preamble was amended by
- 24th Amendment
 - 42nd Amendment
 - 39th Amendment
 - None of the above
37. Fraternity means
- Spirit of brotherhood
 - Fatherly treatment
 - Unity and integrity
 - Elimination of Economic Justice
38. In the final form of the Constitution adopted by the Constituent Assembly, how many Articles and Schedules were there?
- 397 Articles and 7 Schedules
 - 395 Articles and 4 Schedules
 - 400 Articles and 10 Schedules
 - 395 Articles and 8 Schedules

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- 39. The Preamble of the Indian Constitution does not contain concept of
 - a) Democratic
 - b) Adult Franchise
 - c) Sovereignty
 - d) Fraternity
- 40. The strength of the Constituent Assembly, after the withdrawal of the Muslim League, was reduced to
 - a) 299 members
 - b) 329 member
 - c) 331 members
 - d) 359 members
- 41. The Fundamental Rights of a Citizen can be suspended
 - a) By the Parliament through a Law enacted by two – third majority
 - b) By the President during a National emergency
 - c) By the Supreme Court
 - d) None of these
- 42. Which authority can a Citizen approach for securing Right of Personal freedom
 - a) The Parliament
 - b) The President
 - c) Supreme Court alone
 - d) Both Supreme Court and High Court
- 43. The main objective of the Fundamental Rights is to
 - a) Ensure Independence of Judiciary
 - b) Promote a Socialist Pattern of Society
 - c) Ensure Individual liberty
 - d) Ensure all the above
- 44. Under which section of IT Act, stealing any digital asset or information is written a cyber crime
 - a) 65
 - b) 65 - D
 - c) 67
 - d) 70
- 45. Fundamental duties of the Indian Citizen, were
 - a) Enshrined in the original Constitution
 - b) Added to the Constitution by the 42nd Amendment.
 - c) Added to the Constitution by the 44th Amendment.
 - d) Added to the Constitution in the wake the Supreme Court Judgment Keshavnanda Bharati case with consent of all the Political parties.
- 46. Which one of the following Fundamental Right has been subject of maximum litigation since the inauguration of the Constitution?
 - a) Right to Freedom of Speech
 - b) Right to Constitutional Remedies
 - c) Right to Property
 - d) Right against Exploitation
- 47. The Fundamental Rights of Citizens were
 - a) Incorporated in the original Constitution
 - b) Outlined in an Act of Parliament in 1952
 - c) Incorporated by the 42nd Amendment
 - d) Incorporated by the 44th Amendment
- 48. The Fundamental Rights of Indian Citizen have been criticized on the ground that
 - a) They are hemmed in by too many restrictions.
 - b) They are hemmed in languages beyond the comprehension of ordinary citizen
 - c) They are absolute
 - d) Both (a) and (b).
- 49. Respite means
 - a) Death due to drowning
 - b) Awarding lesser punishment
 - c) Death due to strangulation
 - d) Painless death
- 50. The Governor recommends the imposition of President's rule in the State
 - a) On the recommendation of the State Legislature
 - b) On the recommendation of the C.M.
 - c) On the recommendation of Council of Minister
 - d) If he is satisfied that the State Government cannot be carried on his accordance with the provision of the Constitution.
- 51. Who of the following acted as the Constitutional Advisor of the Constituent Assembly
 - a) Dr. B.R. Ambedkar
 - b) Dr. Babu Rajendra Prasad
 - c) B.N. Rao
 - d) Dr. Sachidanand Sinha
- 52. Which one of the following provisions of the Constitution came into force soon after its adoption on 26th November 1949?
 - a) Provision relating to Citizenship
 - b) Elections
 - c) Provisional Parliament
 - d) All the above
- 53. The three types of Justice referred in our Preamble are
 - a) Social, Economic and Social
 - b) Economic, International and Political
 - c) Economic, Religious and Social
 - d) Religious, Social and Political
- 54. What was the exact Constitutional status of the Indian Republic on January 26, 1950, when the Constitution was inaugurated?
 - a) A Democratic Republic
 - b) Sovereign Democratic Republic
 - c) A Sovereign Secular Democratic Republic
 - d) A Sovereign Socialist Secular Democratic Republic.
- 55. Right to against Exploitation seeks to protect the weaker sections of Society by
 - a) Giving equal pay for equal work for men and women.
 - b) Prohibiting human trafficking and beggar
 - c) Providing compulsory education for children below the age of 14 years
 - d) Forcing a person to work against his will without payment
- 56. Which one of the following Directive principles can be described as Gandhian in nature?
 - a) Providing equal pay for equal work for both Men and Women
 - b) Workers participation in Management
 - c) Organization of Village Panchayats as units of self Government
 - d) Separation of Judiciary from the Executive.
- 57. Who has been vested with the power to decide whether the restrictions imposed on the Fundamental Rights of Indian Citizen are reasonable or not
 - a) The Parliament
 - b) The President
 - c) The Courts
 - d) None of the above
- 58. Which one of the following Rights conferred by the Constitution is also available to Noncitizens.
 - a) Freedom of speech assembly and association
 - b) Freedom to move, reside and settle in any part of the territory of India
 - c) Freedom to acquire property or to carry on any occupation, trade or business
 - d) Right to Constitutional remedies.
- 59. Which one of the following has been wrongly listed as a special feature of Fundamental Rights in India
 - a) Fundamental Rights are more sacrosanct than rights granted by ordinary laws
 - b) Fundamental Rights are subject to reasonable restrictions
 - c) Fundamental Rights are Justifiable and can be enforced through the Supreme Court
 - d) None of these.

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60. The main objective of the Cultural and Educational Rights granted to the Citizen is
 a) To preserve the rich culture heritage of India.
 b) To evolve a single integrated India culture.
 c) To help the minorities to conserve their culture.
 d) All the above.
61. For hacking a database or accessing and manipulating data which of the following language the hacker must know?
 a) SQL b) HTML c) TCL d) F #
62. _____ are piece of programs or scripts that allow hackers to take control over any system.
 a) Exploits b) Antivirus c) Firewall bypassers d) Worms
63. The process of finding vulnerabilities and exploiting them using exploitable scripts or programs are known as
 a) Infiltrating b) Exploitation c) Cracking d) Hacking
64. How many types of exploits are there based on their nature from hacking perspective?
 a) 04 b) 03 c) 02 d) 05
65. A _____ is a set of changes done to any program or its associated data designed for updating fixing or improving it.
 a) Scratch b) Patch c) Fixer d) Resolver
66. Fixing of security vulnerabilities in a system by additional programs is known as _____ patches
 a) Hacking b) Database c) Server d) Security
67. _____ are some very frequent updates that come for every antivirus.
 a) Patch update b) Data update
 c) Code update d) Definition update
68. Cyber – Crime can be categorized into _____ types.
 a) 04 b) 03 c) 02 d) 06
69. Which of the following is not a type of peer to peer cyber – crime.
 a) Phishing b) Injecting Trojan to a target victim
 c) MITM d) Credit card details leak in deep web
70. In which year India's IT Act came into existence?
 a) 2000 b) 2001 c) 2002 d) 2003
71. The Chief Election Commissioner can be removed from his office before the expiry of term by the
 a) Chief Justice of India
 b) Prime Minister on the recommendation of Cabinet
 c) President on the recommendation of Parliament after the impeachment
 d) President on the advice of Chief Justice of India.
72. The quorum of minimum number of members required to hold the meetings of either houses of Parliament is
 a) One - tenth b) One - fifth c) One - third d) 72 hours

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73. The advice of the Supreme Court is
 a) Binding of the President
 b) Binding on the President if it is tendered unanimously
 c) Not binding on the President
 d) Binding in certain cases and not binding in other cases
74. The Governor reserves the Right to issue ordinances
 a) When the State Legislature is not in session and he feels that there is an immediate need of action
 b) Whenever the State is under President's Rule
 c) Whenever he likes
 d) None of these
75. The Writ of Certiorari is issued by a Superior Court
 a) To an Inferior Court to stop further proceedings in a particular case
 b) To an Inferior Court to transfer the record of proceedings in a case for its review
 c) To an Office to show his right to hold a particular Office
 d) To a Public authority to produce a person detained by it before the Court within 24 hours.
76. Which one of the following was wrongly listed as a duty of Indian Citizens
 a) To uphold and protect the Sovereign unity and integrity of the Country
 b) To promote harmony and the spirit of common brotherhood among the people of India
 c) To protect and pressure the Natural Environment
 d) To practice Family planning and control population.
77. The Directive Principles Aim at
 a) Ensuring Individual liberty
 b) Ensuring strengthening of the Country's Independence
 c) Providing a social and economic base for a genuine democracy in the Country.
 d) Achieving all the above objectives.
78. The Directive Principles are the
 a) Positive instructions to the Government to work for the attainment of the set objectives
 b) Negative injunctions to the Government to refrain from encroaching on the freedom of the people.
 c) Directive to the State to enhance the International prestige of the Country
 d) Directives to the Government to pursue a policy of non alignment.
79. Which one of the following has been wrongly listed as Directive Principle based on 'Liberal Principles.'
 a) Separation of Judiciary and Executive
 b) Provision of a Uniform Civil code for the Country
 c) Protection of monuments and places of artistic or Historical importance
 d) None of the above has been wrongly listed.
80. The Constitution has vested the Executive power of the Union Government in
 a) The President of India
 b) The Prime Minister
 c) The Council of Minister
 d) All the above
81. Cooking Means
 a) Boiling under pressure
 b) Retaining results which fit theory
 c) Making deceptive statements
 d) Misleading the Public about quality of the product.

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- 82. Which one is not a Trade Secret?
a) Theorem b) Equipment c) Formulae d) Pattern
- 83. The codes of Ethics can be taken as guidelines by the Engineers to
a) Resolve the conflicts b) Formulate problems
c) Overcome the work pressure d) Escape from the responsibility
- 84. A Fault tree is used to
a) Assess the risk involved b) Claim compensation
c) Take free consent d) Improve safety
- 85. Risk of harm equal to probability of producing benefit is
a) Inevitable Risk b) Acceptable Risk
c) Risk which cannot be avoided d) None of these
- 86. One of the Aims of studying Engineering Ethics is to
a) Inspire Engineers to acquire in depth knowledge in their field
b) Acquire new skills in Engineering testing.
c) Stimulate moral imaginations
d) Make Engineers self – confident in discharging their duties.
- 87. Which one is not an impediment to responsibility?
a) Group think b) Microscopic vision
c) Trademark d) Egocentric tendencies
- 88. Being safe or blaming others is type of attitude of responsibility of Engineers
a) Minimalist b) Reasonable care c) Good works d) None of these
- 89. To overcome an impediment 'Unethical Acceptance', what step an Engineer has to take?
a) Accept and Analyse b) Analyse and Accept
c) Always say Yes Boss d) None of these
- 90. Engineering Ethics,
a) Stimulates the moral imagination
b) Provides up – to – date knowledge in the field of Engineering.
c) Stimulates to Conduct Research d) Stresses on Time Management.
- 91. Impeachment proceedings can be initiated against the President in either House of Parliament only if a resolution signed by members of the House is moved.
a) 10 percent of total b) 25 percent of total
c) 20 percent of total d) 15 percent of total
- 92. Which one of the following functions of Prime – Minister has been wrongly listed?
a) He presides over the meeting of the Cabinet
b) He prepares the agenda for the meeting of the Cabinet.
c) He coordinates the working of various departments.
d) He chairs the meeting of the various standing and ad-hoc committees of Parliament.
- 93. A motion of no – confidence against the Council Ministers can be moved in the Lok – Sabha, if it is supported by atleast
a) 50 members b) 55 members
c) 100 members.
d) One – third of the total members of Lok – Sabha
- 94. The President can call a Joint session of the two Houses of Parliament
a) If a bill passed by one house is rejected by the other
b) If the amendment proposed to the bill by one house is not acceptable to the other house.
c) If the house does not take any action for six months on a bill remitted by the other house.
d) Under all the above conditions.
- 95. The Members of the Rajya – Sabha except the nominated ones are
a) Directly elected by the people b) Elected by Local Self – Governing bodies
c) Elected by the Legislative Assemblies of the States.
d) Elected partially by Legislative Assemblies and partially by the Local Self Governing bodies.
- 96. The President who is the head of the State under the Parliamentary system prevailing in India.
a) Enjoys absolute powers b) Enjoys limited but real powers
c) Enjoys only nominal powers d) Enjoys no powers
- 97. The Vice – President is the Ex – Office Chairman of
a) The Rajya Sabha b) The National Development Council
c) The Planning Commission d) None of the above
- 98. The Speaker of the Lok – Sabha is
a) Appointed by the President.
b) Appointed by the President on the recommendations of the P.M.
c) Elected by the members of the two houses at a joint sitting.
d) Elected by the members of the Lok – Sabha.
- 99. The Rajya – Sabha is a permanent House but
a) One – third of its members retire every two years
b) One – half of its members retire every three years
c) One – fifth of its members retire every year
d) One – half of its members retire every two years.
- 100. The power to control the expenditure of the Government of India rests exclusively with
a) The Parliament b) The President
c) The Comptroller and Auditor General d) The Union Finance Minister
