

Roll No.

3042

B. Tech. 3rd Semester (EE)

Examination – December, 2022

ELECTRICAL MACHINES - I

Paper : PCC-EE-209-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Explain the following : 2.5 × 6 = 15

- (a) Discuss the signification of back emf in dc motor.
- (b) Define pole pitch & commutator pitch.
- (c) What is hysteresis loss in transformer ? How it can be reduce ?
- (a) Derive emf equation of single-phase transformer.

(e) State ampere circuit law.

(f) What is leakage reactance of transformer ?

UNIT – I

2. State and explain Biot-Savart's law. 15

3. Derive expression for field energy, co-energy & field energy density for electromechanical energy conversion process in magnetic system. Assume linearity in the system. 15

UNIT – II

4. Explain the construction working of DC machine and derive the back emf equation. 15

5. What do you understand by armature reaction in DC machine ? Explain the effect of armature reaction in detail. 15

UNIT – III

6. A 230V, 1000rpm dc shunt motor has field resistance of 115Ω and armature circuit resistance of 0.5Ω . at no load motor run at 1000rpm with armature current of 4A and with full field flux for a load requiring 80 Nm. Calculate armature current and speed of motor. 15

7. Explain the characteristics of DC series and DC shunt motor in details. 15

UNIT – IV

8. Explain open circuit and short circuit test on single phase transformer in details. 15

9. In a test for determination of the losses of 400V, 50Hz transformer, the total iron losses were found 2500 W at normal voltage and frequency. When the applied voltage and frequency were 220V and 25 Hz. the iron losses were found 850W. Calculate the eddy current losses at normal voltage and frequency. 15

Roll No.

3040

**B. Tech. 3rd Semester (EE)
Examination – December, 2022
ELECTRIC CIRCUIT ANALYSIS**

Paper : PCC-EE-201-G

Time : Three hours]

[Maximum Marks : 75

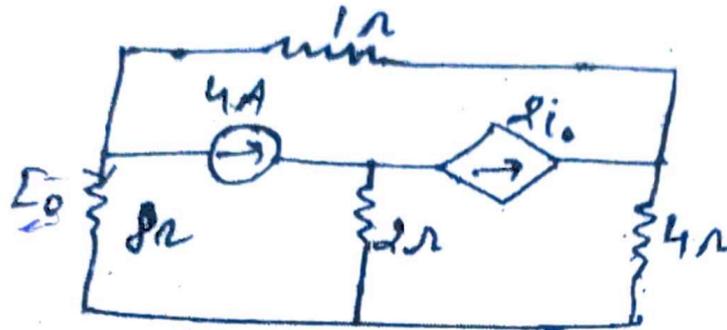
Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Section. Question Number 1 is compulsory.

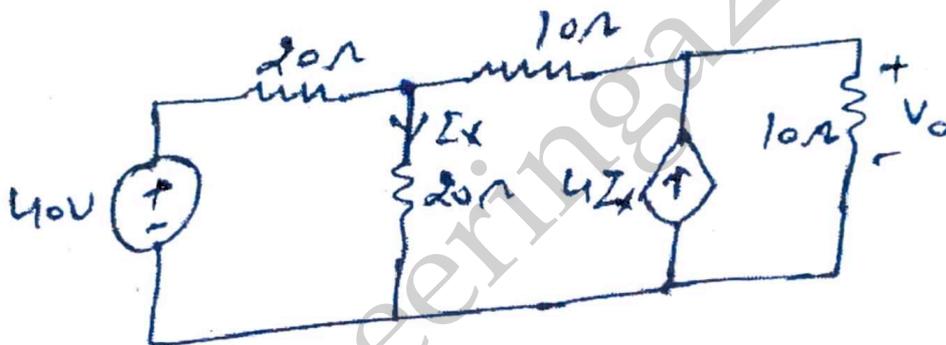
1. (i) What do you mean by supermesh ? 15
- (ii) What are the application of Thevenin theorem ?
- (iii) Write brief about compensation theorem.
- (iv) Write down the fundamental loop matrix in graph theory.
- (v) Why we need Laplace Transform ?
- (vi) Write brief about dot convention in coupled circuit.
- (vii) Explain the concept of steady state response.
- (viii) Define transfer function.
- (ix) Write brief about the overdamped in second order.
- (x) Write down the hybrid parameter in two port network.

SECTION – A

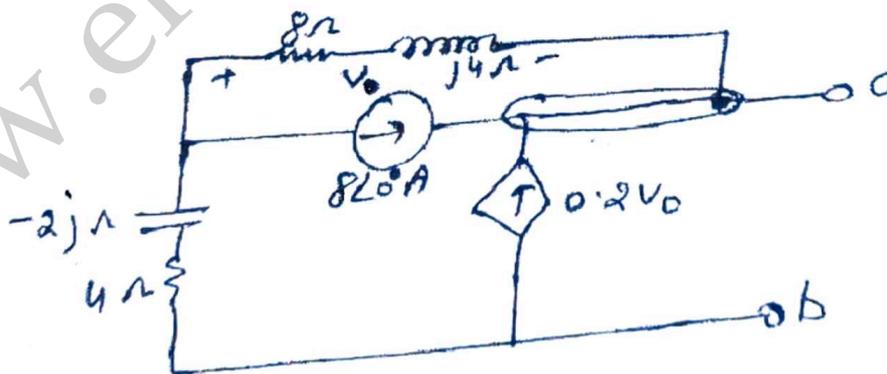
2. (a) Find I_0 in the circuit as given below : 7.5



- (b) Using nodal analysis, determine V_0 in the circuit given below : 7.5

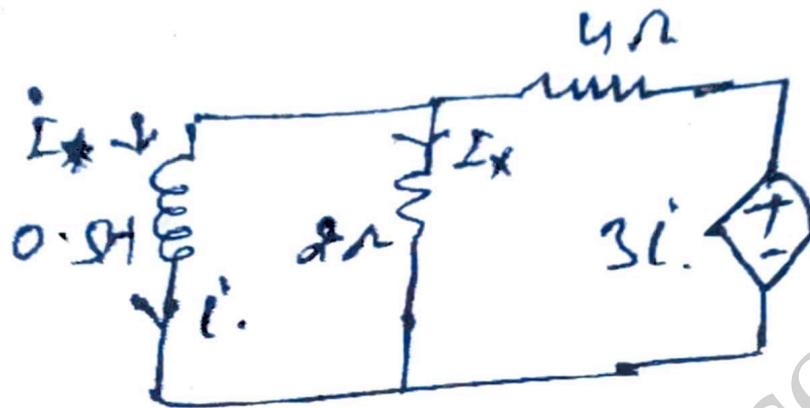


3. Determine the Thevenin equivalent of the circuit as seen from the terminal as given below : 15

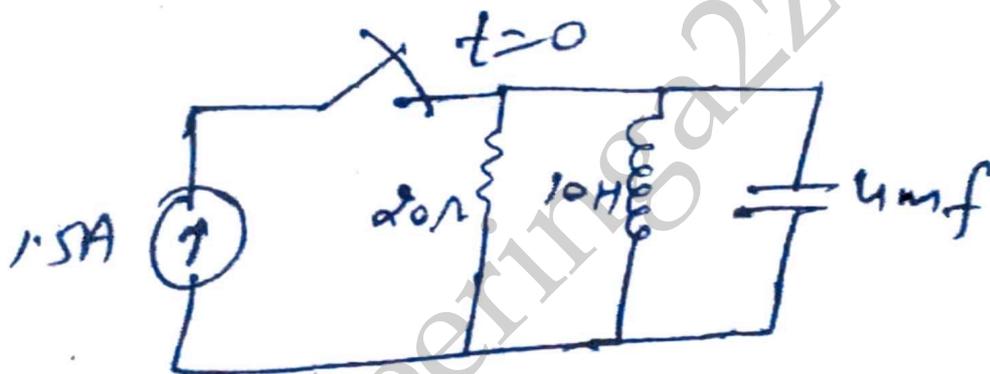


SECTION – B

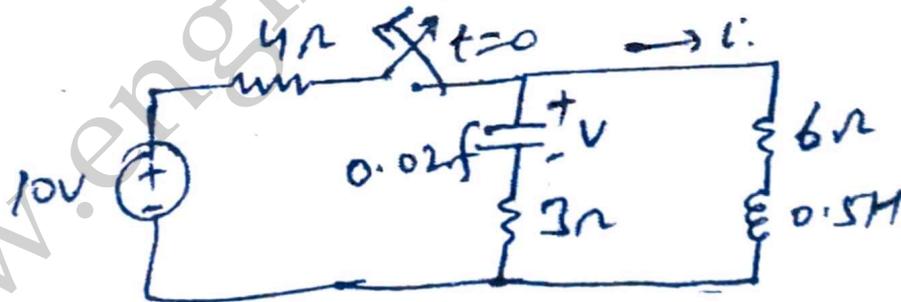
4. (a) Assuming that $i(0) = 10A$, calculate $i(t)$ and $i_x(t)$ in the circuit given below : 7.5



(b) Find $v(t)$ for $t > 0$ for the circuit given below : 7.5



5. Find $i(t)$ in the circuit given below, assume that the circuit has reached steady state at $t = 0$. 15



SECTION - C

6. An impedance function is given by :

15

$$Z(S) = \frac{S(S+3)(S+4)}{(S+2)(S+1)}$$

Find R-L representation of :

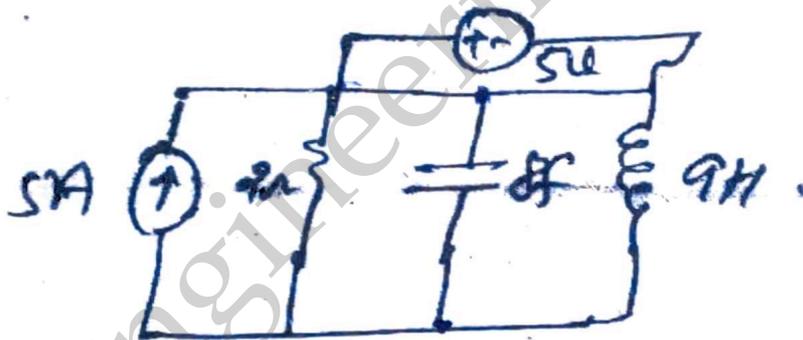
- (a) Foster-I
- (b) Cauer-II.

7. Test whether the following function is p.r.f. or not : 15

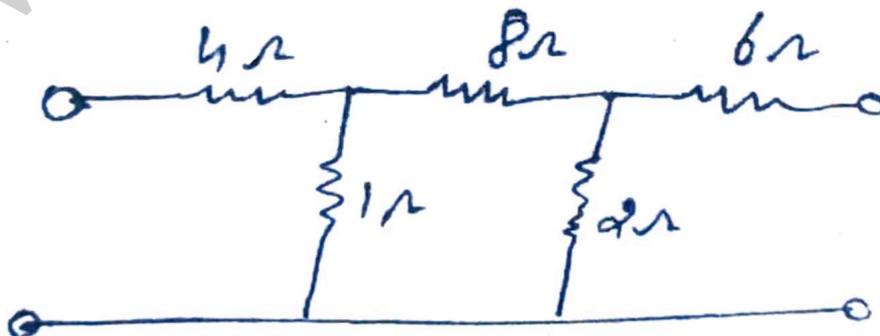
$$f(s) = \frac{s^3 + s^2 + 3s + 5}{s^2 + 6s + 8}$$

SECTION - D

- 8. (a) Derive the expression for the Y_{21} synthesis with R-ohm termination. 7.5
- (b) Explain the series-series interconnection in two port network. 7.5
- 9. (a) The circuit given below, determine the incident matrix and fundamental cut-set matrix. 7.5



- (b) Find the transmission parameter of the circuit given below : 7.5



Roll No.

3041

**B. Tech. 3rd Semester (EE)
Examination – December, 2022**

ANALOG ELECTRONICS

Paper : PCC-EE-205-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Explain the following :

2.5 × 6 = 15

(a) Define knee voltage and breakdown voltage.

(b) Explain the operation of clamper circuits.

(c) Draw the block diagram of 741 OP-Amp.

(d) Why N-MOSFET is preferred over p-MOSFET ?

(e) Explain in brief the application of MOSFET.

- (b) What are the four differential amplifier configurations? Which one is not commonly used and why?

UNIT - I

2. Calculate the efficiency, ripple factor and TUF of half wave rectifier and full wave rectifier. 15
3. (a) Sketch the input and output characteristics of CE configuration of transistor and explain the biasing operation. 10
- (b) Define α and β for a transistor and establish the relationship between them. 5

UNIT - II

4. (a) Differentiate between the Depletion MOSFET and Enhancement MOSFET. 10
- (b) Discuss the working of MOSFET as an amplifier. 5
5. Explain in detail the construction, operation and characteristics of n-channel depletion MOSFET. 15

UNIT - III

6. (a) Explain the working of differential amplifier. 7
- (b) Derive an expression of inverting and non-inverting configuration of operational amplifier. 8
7. Analyze the different feedback configurations and derive the expression of voltage gain, input resistance and output resistance for voltage series feedback amplifier. 15

UNIT – IV

8. Explain in detail the following : 15
- (a) Lead and Lag compensator using op-amp.
 - (b) Precision Amplifier.
9. Explain the working operation of square wave generator and triangular wave generator. 15
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Roll No.

3044

**B. Tech. 3rd Semester (EE)
Examination – December, 2022**

ENGINEERING MECHANICS

Paper : ESC-EE-202-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.

1. Write short notes on the following : $3 \times 5 = 15$

- (a) Polar moment of inertia
- (b) Rolling Coin
- (c) Concept of rigid body, velocity and acceleration
- (d) Gyroscopic effect
- (e) Coefficient of friction

SECTION – A

2. Explain Eigen values principal axis theorem in detail. 15
3. Explain Axis-angle formulation and Euler angles. 15

SECTION – B

4. Explain Newton-Euler's Law of rigid body motion in detail. 15
5. Find the Moment of inertia of a triangle about the base from first principles. 15

SECTION – C

6. Explain the General 3D motion equation in detail. 15
7. Explain modelling of typical supports and joints and discuss the kinematic and kinetic constraints they impose. 15

SECTION – D

8. Explain the relation of the Torsion of shaft with derivation. 15
9. Draw S.F.D. and B.M.D. for the cantilever beam carrying a point load at the free end. 15

Roll No.

3043

**B. Tech. 3rd Semester (EE)
Examination – December, 2022**

MEASUREMENT AND INSTRUMENTATION

Paper : PCC-EE-210-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : First question is compulsory & attempt any one question from each Section. All questions carry equal marks.

1. (a) What is meant by special oscilloscope ?
- (b) Name the constructional parts of induction type energy meter.
- (c) State Piezoelectric Transducers.
- (d) Name the methods used for medium resistance measurement.
- (e) Define Q factor of the coil.
- (f) Explain factors influencing choice of Transducers.

- ✓(g) Distinguish between Direct and Indirect methods of measurements.
- (h) What are absolute instruments ?
- ✓(i) Which Torque is absent in energy meter and why ?
- (j) List the limitation of Electrical Resonance type Frequency meter.

SECTION – A

- ✓2. (a) Draw and explain block diagram of C.R.O .
- ✓(b) Compare spring control and gravity control system in measuring instruments.
- 3. (a) Explain block diagram and working of Function Generator.
- (b) Explain the construction, working principle of L.V.D.T.

SECTION – B

- ✓4. (a) What do you mean by Instrument ? Explain classification of Instruments with examples in detail.
- ✓(b) Explain the construction, working principle and torque equation of PMMC instruments.
- 5. (a) What is Q meter ? Explain its working principle, circuit and applications.
- (b) Draw and explain hot wire type instruments.

SECTION – C

6. (a) Explain the constructional detail and working of a single phase electrodynamic type of Power factor meter.

(b) Describe the working principle and operation of Electrodynamic type wattmeter.

7. (a) Explain the constructional detail and working of Ferrodynamic type Frequency meter.

(b) Write Technical note on Energy Meter.

SECTION – D

8. (a) What do you mean by sensitivity of Wheatstone Bridge ? Explain.

(b) A resistance of approximately 3000 ohm is needed to balance bridge. It is obtained on a 5 dial resistance box having steps of 000,100,10,1 and 0.1 ohm. The measurement is to be guaranteed to 0.1 percent. For this accuracy, how many of these dials would it be worth adjusting ?

9. (a) Describe the working of Megaohm bridge.

(b) Derive the equations of balance for an Anderson's Bridge. Draw the phasor diagram for conditions under balance.