

9. Define the voltage regulation of a transformer. For which type of load the voltage regulation is negative? Derive the expression using the equivalent circuit. Also derive condition for (a) Zero Regulation, and (b) Maximum Regulation. 15

Roll No.

3042

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

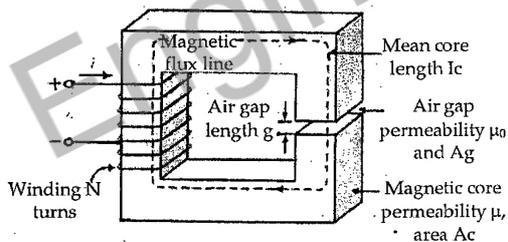
Note : Attempt *five* questions in all. Q. 1 is *compulsory*. Attempt *four* more question from the sections A, B, C & D by selecting at least *one* question from each section.

1. (a) Define the following terms : (i) Reluctance, (ii) Permeability (iii) Permaence (iv) Retentivity.
2.5 × 6 = 15
- (b) Mention the difference between core and shell type transformer. What determines the thickness of laminations or stampings ?
- (c) What is the principle of operation of DC motor ? What happens when a DC motor is connected across an AC Supply ?

- (d) Define all day efficiency of a transformer.
- (e) What are the conditions for proper parallel operation of single phase transformers ?
- (f) What do you mean by back EMF, give expression ?

SECTION - A

2. State and explain Ampere Law and Biot Savart Law. Derive the equation for magnetic fields produced by a bar magnet and a current carrying coil. 15
3. The magnetic circuit shown in Fig has dimensions $A_c = 9 \text{ cm}^2$, $g = 0.050 \text{ cm}$, $l_c = 30 \text{ cm}$, and $N = 500$ turns. Assume the value $\mu_r = 70,000$ for core material. (a) Find the reluctances R_c and R_g . For the condition that the magnetic circuit is operating with $B_c = 1.0 \text{ T}$, find (b) flux Φ and (c) the current i . 15



3042-1350-(P-4)(Q-9)(22) (2)

SECTION - B

4. What is armature reaction? Describe the effects of armature reaction on the operation of DC machines. How the armature reaction is minimized ? 15
5. (a) Explain lap winding and wave winding. 7
 (b) A 4 pole, wave wound armature has 720 conductors and is rotated at 1000 rev/min. If the useful flux is 20m Wb, calculate the generated voltage. 8

SECTION - C

6. What is the necessity of a starter for D.C. motor ? Explain, with a neat sketch, the working of a 3 point D.C. shunt motor starter, bringing out the protective features incorporated in it. 15
7. Sketch the speed-load characteristics of a D.C. (a) shunt motor, (b) series motor, (c) cumulatively compounded motor. Account for the shape of the above characteristics curves. 15

SECTION - D

8. Develop the exact equivalent circuit of I-phase transformer. From this derive the approximate and simplified equivalent circuit of the transformer. State the various assumptions made 15

3042-1350-(P-4)(Q-9)(22) (3)

P. T. O.

Roll No.

3041

**B. Tech (EE) 3rd Semester
Examination – February, 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. Question No. 1 is *compulsory*. Attempt *four* more question from the sections A, B, C & D by selecting at least *one* question from each Section.

1. Answer the following questions : 2.5 × 6 = 15

- (a) Explain load line concept.
- (b) Draw high frequency model of BJT.
- (c) What are the conditions for oscillator ?
- (d) What are the properties of ideal op-amp ?
- (e) List out merits and demerits of negative feedback on amplifier performance.
- (f) Distinguish between depletion mode and enhancement mode of MOSFET.

SECTION – A

2. Discuss the working of full wave centre tap rectifier. Drive the expression for : 15
- (a) DC o/p voltage
 - (b) Rectification efficiency
 - (c) PIV
 - (d) Ripple factor
 - (e) RMS value of voltage.
 - (f) Form factor.
3. Explain different type biasing of BJT. 15

SECTION – B

4. (a) Draw and explain high frequency model of MOSFET. 7
- (b) Derive the expressions for current gain, input impedance, voltage gain and output impedance using h parameters of MOSFET. 8
5. (a) Draw and explain the frequency response of CS amplifier. 10
- (b) With the help of neat diagram, explain the small signal of MOSFET. 5

SECTION – C

6. Explain the effect of finite open loop and bandwidth on circuit performance of op-amp amplifier. 15

3041-1300-(P-3)(Q-9)(22) (2)

7. (a) Explain small signal operation of MOS differential pair. 7
- (b) Discuss different topologies of feedback network. 8

SECTION – D

8. (a) Explain the working of Instrumentation amplifier with a neat diagram. Derive the expression for output voltage. 7
- (b) With neat circuit diagram explain the operation of RC phase shift oscillator using op-amp. Derive an expression of frequency of oscillation of RC phase shift oscillator. 8
9. With the help of internal circuit diagram of IC555 explain the operation of a stable multivibrator. Derive the expression for frequency of oscillation. 15

3041-1300-(P-3)(Q-9)(22) (3)

P. T. O.

9. (a) Describe the working of Megaohm bridge.
- (b) Describe how an unknown capacitance can be measured with the help of D'Sauty's bridge. What are limitation of this bridge.
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Roll No.

3043

**B. Tech. 3rd Semester (EE)
Examination – February, 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 : Question No. 1 is *compulsory* & attempt any *one* from each section. All questions carry equal marks

1. (a) Define Static characteristic with examples.
- (b) What is Principle of CRO ?
- (c) Define Absolute standards.
- (d) What do you mean by gravity and spring controls.
- (e) What do you mean by Hot wire instruments ?
- (f) Mention Limitations of Wheatstone bridge.
- (g) What is the use of Meggar ?

- (h) Explain different difficulties in high resistance measurement.
- (i) Why calibration of instrument is important ?
- (j) State the advantages of Kelvin's double bridge.

SECTION – A

- 2. (a) Compare Accuracy and Precision and Primary and Secondary standards.
- (b) Explain and compare different damping methods.
- 3. (a) Describe with neat sketches the following types of Primary detecting elements :
 - (i) Bourdon tubes
 - (ii) bellows
 - (iii) Diaphragms
- (b) Sketch the thermocouple circuit showing important details.

SECTION – B

- 4. (a) Draw the block diagram showing the basic functional elements of an instrument and explain the functions of each.
- (b) Explain the construction, working Principle and torque equation of Moving Iron type instruments.

- 5. (a) Explain constructional detail of Multi meter. How different resistances are measured ?
- (b) Draw and explain Hot wire type instruments.

SECTION – C

- 6. (a) Explain the constructional detail and working of a single phase Moving Iron type of Power factor meter.
- (b) List the advantages and disadvantages of Electrodynamic type wattmeter.
- 7. (a) Explain the constructional detail and working of Electrical Resonance type Frequency meter.
- (b) Explain compensation and creep in energy meter.

SECTION – D

- 8. (a) Explain the Loss of charge method for measurements of insulation resistance of cables.
- (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. Write short note on :

7.5 + 7.5 = 15

- (i) Convolution integral
- (ii) Transfer function

Roll No.

3040

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

ELECTRIC CIRCUIT ANALYSIS

Paper : PCC-EE-201-G

Time : Three Hours]

[Maximum Marks : 75

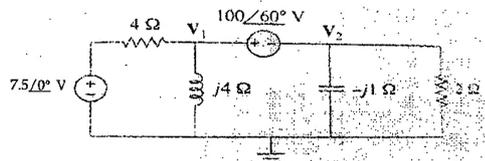
Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

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

1. (a) Explain the concept of duality in network. 3.75
- (b) What do you mean by initial and final condition in network elements ? 3.75
- (c) Explain the concept of mutual inductance. 3.75
- (d) Write down about the z-parameter. 3.75

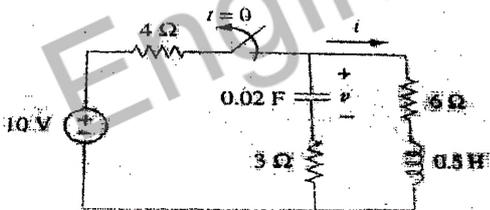
SECTION - A

- State and prove superposition theorem in AC with suitable example. 15
- Find the value of V_1 and V_2 in the circuit shown in figure below using nodal analysis : 15



SECTION - B

- Derive the expression for source free response of RL circuit. 15
- Find $i(t)$ in the circuit, assume that the circuit has reached steady state at $t = 0$: 15



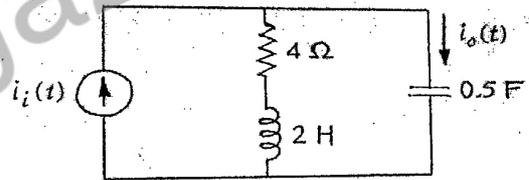
3040-1350-(P-4)(Q-9)(22) (2)

SECTION - C

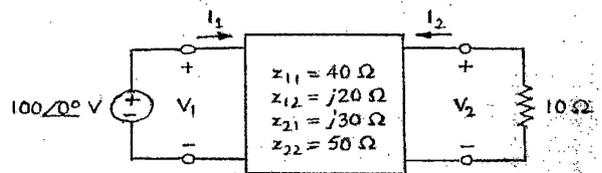
- Write short note on : 7.5 + 7.5 = 15
 - Cauer - I
 - Foster - II
- What are the properties of RL impedance and RC admittance ? 15

SECTION - D

- (a) For the circuit shown in figure below calculate the gain and its poles and zeros : 7.5



- Find the I_1 and I_2 in the circuit given below : 7.5



3040-1350-(P-4)(Q-9)(22) (3)

P. T. O.

Roll No.

3044

**B. Tech. 3rd Semester (EE)
Examination – February, 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 : $5 \times 3 = 15$

- (a) Euler's theorem
- (b) Law of Coulomb's friction
- (c) Polar moment of inertia
- (d) Gyroscope
- (e) Free precession

3044-1300-(P-3)(Q-9)(22)

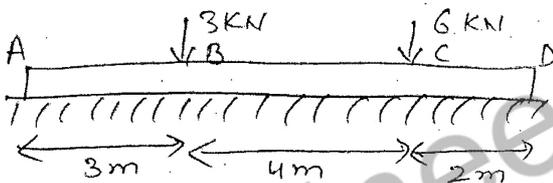
P. T. O.

SECTION - A

2. Explain principal axis theorem in detail. 15
3. Explain co-ordinate transformation of vectors and tensors with an example. 15

SECTION - B

4. Explain Newton-Euler's law of rigid body motion in detail. 15
5. A rigid bar AB is acted by forces as shows in figure below. Reduce the system into (i) a single force (ii) force system at A : 15



SECTION - C

6. Explain General 3-D motion equation in detail. 15
7. (a) With neat sketches differentiate b/w motion of translation and motion of rotation. 7
- (b) Describe the Motion of Rolling Coin. 8

SECTION - D

8. Explain the relation of torsion of shaft with derivation. 15
9. Draw S.F. and B.M. diagram of the following : 15

