



B.E. DEGREE EXAMINATIONS: NOV/DEC 2022

(Regulation 2018)

Third Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EEI3201T DC Machines and Transformers

COURSE OUTCOMES

- CO1:** Apply laws of magnetic circuits to understand the performance characteristics of DC machines and its applications.
- CO2:** Conduct and analyze various testing procedures of DC generators and motors
- CO3:** Analyze performance characteristics of transformers and its applications
- CO4:** Conduct and analyze various testing procedures of transformers
- CO5:** Select DC machines and transformers for various applications

Time: Three Hours

Maximum Marks: 100

Answer all the Questions: -

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|---|-----|-------------------|
| 1. State the rule which is used to find the direction of induced EMF in the DC Generator. | CO1 | [K ₂] |
| 2. Define Armature Reaction. | CO2 | [K ₁] |
| 3. Why is flux control method named as above rated speed control method? | CO2 | [K ₂] |
| 4. Draw the Electrical and Mechanical Characteristics of DC Series Motor. | CO1 | [K ₁] |
| 5. Differentiate Electrical Efficiency from Mechanical Efficiency of a DC generator. | CO4 | [K ₂] |
| 6. Draw the different power stages of DC Generator. | CO1 | [K ₁] |
| 7. Can a transformer operate on DC? Justify | CO3 | [K ₂] |
| 8. List the applications of Auto Transformer. | CO5 | [K ₂] |
| 9. What is indirect method of testing in transformer? | CO4 | [K ₂] |
| 10. Why the rating of transformers is specified in kVA? | CO3 | [K ₂] |

Answer any FIVE Questions: -

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

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|--|----|-----|-------------------|
| 11. Explain in detail the constructional features of DC Machine with neat diagram. Also justify the choice of material for each part of the machine. | 16 | CO1 | [K ₂] |
| 12. a) Derive an equation for Torque developed in a DC Motor. | 10 | CO1 | [K ₂] |

- b) A 4 pole, lap wound, DC generator has a useful flux of 0.07wb per pole. 06 CO1 [K₃]
Calculate the generated EMF, when it is rotated at a speed of 900rpm with the help of prime mover. Armature consists of 440 number of conductors. Also calculate the generated EMF if the lap wound armature is replaced by wave wound armature.
13. a) Explain the different types of losses that occur in DC Machine with mathematical expression. 08 CO2 [K₂]
- b) In a DC Shunt Motor, the brake test was conducted and the full load readings are as follows: S₁=9.1kg, S₂=0.8kg, I=10A, Supply Voltage, V=110V, Speed, N=1320 rpm, radius of brake drum=7.5cm. Calculate its full load efficiency. 08 CO2 [K₃]
14. a) Draw and explain the Internal and External Characteristics of DC Shunt Generator. 04 CO2 [K₂]
- b) With neat diagram, explain the working of three Point Starter. 12 CO1 [K₂]
15. a) Derive an EMF equation of a Single-Phase Transformer. 08 CO3 [K₂]
- b) What is parallel operation of Transformers? List the conditions for satisfactory parallel operation. 08 CO3 [K₂]
16. a) With a neat sketch explain the concept of Polarity Test and justify the need for performing this test in transformers. 08 CO4 [K₂]
- b) Draw an equivalent circuit of a single phase 1100V/220V transformer which gives the following test results: 08 CO4 [K₃]

OC Test	1100V	0.5A	55W on HV side	Secondary being open circuited
SC Test	10V	80A	400W on LV side	Primary being short circuited
