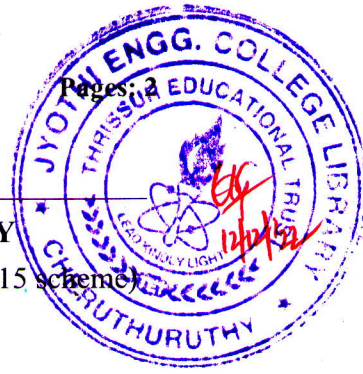




Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree (S,FE) Examination December 2022 (2015 scheme)

Course Code: EE205**Course Name: DC MACHINES AND TRANSFORMERS**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions, each carries 5 marks.*

Marks

- | | | |
|---|---|-----|
| 1 | Compare lap and wave windings used for DC machine armature | (5) |
| 2 | Derive the E M F equation of a DC generator | (5) |
| 3 | Why dc series motor is never started on no-load? Explain using speed torque characteristics | (5) |
| 4 | Draw the phasor diagram of a transformer on (i) inductive load (ii) no load | (5) |
| 5 | A 40KVA transformer has iron loss of 450W and full load copper loss of 850W. If the power factor of the load is 0.8 lagging. Find the full load efficiency of the transformer | (5) |
| 6 | Derive an expression for the saving of copper in an autotransformer as compared to an equivalent two winding transformer | (5) |
| 7 | What are the advantages and disadvantages of star- star connection | (5) |
| 8 | Define vector grouping. List the common vector groups used in three phase transformers. | (5) |

PART B*Answer any two full questions, each carries 10 marks.*

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|----|---|-----|
| 9 | a) List any five parts of a dc machine and write their functions | (5) |
| | b) Derive the electro-dynamic equation of rotating electrical machines and explain the principle of energy conversion | (5) |
| 10 | a) A 4-pole dc long shunt compound generator supplies 100A at a terminal voltage of 500V. The armature resistance is 0.02Ω , series field resistance is 0.04Ω and shunt field resistance is 100Ω . Find the generated emf. | (5) |
| | b) What are equalizer rings? Why it is generally used in lap windings instead of wave windings? | (5) |

- 11 a) A dc shunt generator gave the following results in the OCC test at a speed of 800 rpm (5)

If (A)	1	3	5	7	9	10
E _g (V)	90	250	300	330	350	360

Calculate: (i) The voltage generated by the generator when the field circuit resistance is 50Ω (ii) Critical value of the shunt field resistance (iii) Critical speed when the field circuit resistance is 50Ω

- b) What is armature reaction? What are the effects of armature reaction on the performance of dc machine? (5)

PART C

Answer any two full questions, each carries 10 marks.

- 12 a) With a neat diagram, explain the working of four-point starter (5)
- b) A 4 pole 500V dc shunt motor has 720 wave connected conductors on its armature. The full load armature current is 60A and flux per pole is 0.03wb. The armature resistance is 0.2Ω and the contact drop per brush is 1V. Find the back emf and speed of rotation. (5)
- 13 a) Derive the condition for maximum efficiency in a transformer (5)
- b) Draw and explain the characteristics curves of a dc series motor and compare it with that of a dc shunt motor (5)
- 14 a) List and explain the different cooling methods used in transformer (5)
- b) Develop the equivalent circuit of a 3KVA, 240/120V single phase transformer referred to the secondary side from the below values (5)
- OC Test: 120V, 1.2A, 60W SC Test: 12V, 12.5A, 120W

PART D

Answer any two full questions, each carries 10 marks.

- 15 a) What are the necessary conditions for parallel operation of 3-phase transformers? (5)
- b) Differentiate between commercial efficiency and all-day efficiency? (5)
- 16 a) What is the purpose of tertiary winding in a transformer? (5)
- b) With neat circuit diagram, explain how a two-phase supply can be obtained from a three-phase supply (5)
- 17 a) Explain the working of Off-Load tap changing transformer with help of neat diagram (5)
- b) Derive the condition to be satisfied for zero voltage regulation and maximum voltage regulation for a transformer (5)
