# SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

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Total number of pages:[2]

Total number of questions: 06

## B.Tech. || EE || 3ʳᵈ Sem
# TRANSFORMERS AND DIRECT CURRENT MACHINES
## Subject Code: BTEE-302A
### Paper ID:

Time allowed: 3 Hrs

Max Marks: 60

**Important Instructions:**

- All questions are compulsory
- Assume any missing data

### PART A (2×10)

Q. 1.   Short-Answer Questions:

All COs

(a) Why is transformer core laminated?

(b) What is the use of transformer oil and conservator in a transformer?

(c) Why is the auto-transformer not used as a distribution transformer?

(d) Draw the phasor diagram of a transformer under lagging p.f. conditions.

(e) Why is all day efficiency lower than commercial efficiency?

(f) Write down the voltage and current transformation ratios for Y- Y and Δ- Y connections of 3-phase transformers.

(g) Discuss the significance of back e.m.f. in a d.c. motor.

(h) What are Inter-poles?

(i) Enumerate the limitations of three point starter.

(j) Why is it necessary to wind field coils of a d.c. shunt generator with large number of turns of fine wire?

### PART B (8×5)

Q. 2.   Derive the expression for the e.m.f. of an ideal transformer. Also deduce the     CO3
condition for the maximum efficiency.

OR

Deduce an expression for the torque developed by the armature of a d.c. motor. Also draw torque vs speed characteristics for series, shunt and compound motors.

Q. 3.  Describe the Scott connections and their phasor diagram with neat diagrams.    CO4

OR

(a) Develop the equivalent circuit diagram for a single phase transformer.
(b) What are the conditions for the parallel operation of 3-phase transformers?
(4 each)

Q. 4.  The maximum efficiency of a 100KVA, 6600/250V, 50 Hz single phase    CO2
transformer occurs at half load and is 98% at unity p.f. Calculate the full load
efficiency at 0.8 p.f. lagging.

OR

Calculate the value of voltage regulation at 0.8 p.f. lagging for a transformer
with resistance drop 2% and reactance drop 4% of the voltage.

Q. 5.  The primary and secondary voltages of an auto transformer are 500V and    CO2
400V respectively. Show with the aid of a diagram the current distribution in
the windings when the secondary current is 100A and calculate the economy
of copper in this case.

OR

(a) A 4-pole, 500V d.c. shunt motor has 700 wave connected conductors on its
armature. The full load armature current is 60A and flux per pole is 30 mWb.
Calculate the full load speed if the motor armature resistance is 0.2 $\Omega$ and the
brush drop is 1V per brush.
(5)
(b) Explain why the starting torque of a series motor is more than that of a
shunt motor of the same rating.
(3)

Q. 6.  Explain the armature reaction in a d.c. generator with neat diagrams.
CO1

OR

Write short notes on any two of the following-
(a) Methods of improving commutation.                (4 each)
(b) Speed control of d.c. shunt motors.
(c) Braking and plugging in d.c. motors.