

SUBJECT CODE NO:- P-183
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(EEP/EE/EEE) Examination MAY/JUNE-2016
Transformers & DC Machines
(Revised)

[Time:Three Hours]**[Max Marks:80]**

“Please check whether you have got the right question paper.”

- N.B
- i) Q.No.1 and Q.No.6 are compulsory.
 - ii) Solve any two questions from Q.2 to Q.5.
 - iii) Solve any two questions from Q.7 to Q.10.
 - iv) Assume suitable additional data, if required.

Section A

- Q.1 Answer the following. (Any five)
- a) What is star – star connection? What are its merits and demerits? 02
 - b) Why is core of transformer laminated? 02
 - c) Name the type of material used for transformer core giving reason. 02
 - d) Why is rating of transformer given in KVA? 02
 - e) What is scott connection? Draw its connection diagram. 02
 - f) Draw speed-torque characteristics of D.C. servo motor. Write its applications. 02
 - g) What is V-V connection? When it is used? 02
 - h) What is a step angle? Calculate the step angle for a three-phase, 24-pole permanent magnet type stepper motor. 02
- Q.2
- a) Develop the phasor diagram of single phase transformer under load condition giving necessary equations. Assume inductive load. 08
 - b) A 4KVA, 200/400V, single phase transformer has equivalent resistance and reactance referred to low voltage side equal to 0.5 ohm and 1.5 ohms respectively. Find the terminal voltage on the high voltage side when it supplies $\frac{3}{4}$ th full load at power factor of 0.8, the supply voltage being 220V. Hence, find the output of the transformer and its efficiency if the core losses are 100W. 07
- Q.3
- a) With the help of neat circuit diagram explain how O.C. test is conducted on single-phase transformer. 05
 - b) With the help of neat circuit diagram explain how S.C. test is conducted on single phase transformer. 05
 - c) Explain how is efficiency and regulation calculated with the help of these two tests? 05
- Q.4
- a) State the condition necessary before two, three phase transformer may be connected in parallel and also state the conditions for satisfactory parallel operation. 07
 - b) Two 3-phase transformers A and B having the same no. load line voltage ratio 3300/400V supply a load of 750KVA at 0.707 lagging when operating in parallel. The rating of A is 500KVA, its resistance is 2% and reactance is 3%. The corresponding values for B are 250KVA, 1.5% and 4% respectively. Assuming that both transformers have star connected secondary windings. Calculate
 - a) The load supplied by each transformer. 08
 - b) The power factor at which each transformer is working.
 - c) The secondary line voltage

Q.5	Write short notes (<u>Any three</u>)	15
	a) Variable reluctance stepper motor	
	b) D.C. servomotor	
	c) Equivalent circuit of transformer	
	d) Auto-transformer	
	e) No load operation of transformer	

Section B

Q.6	Answer the following. (<u>Any five</u>)	
	a) How are D.C. machines classified according to method of excitation? Explain with the help of diagrams.	02
	b) What are different types of D.C. generators? Draw schematic diagram for each.	02
	c) What is the function of commutator in D.C. generator?	02
	d) Draw load characteristics of D.C. series generator. Write its applications.	02
	e) A 400V shunt motor has an armature resistance of 0.3Ω and shunt field resistance of 200Ω . If the current taken from the supply is 20A, what is the emf generated?	02
	f) What are the causes for the failure of the generator to build?	02
	g) Draw speed torque characteristics for D.C. shunt and series motor. Write their applications.	02
	h) Why is starter necessary for D.C. motor?	02
Q.7	a) Derive EMF equation of D.C. machine.	07
	b) Explain the functions of the following in D.C. machines.	08
	i. Interpoles	
	ii. Compensating winding	
Q.8	a) State the factor deciding speed of D.C. motor. Explain in detail speed control methods of D.C. shunt motor.	08
	b) A 200V, d.c shunt motor develops an output of 16.9KW when taking an input of 20.2KW. The field winding resistance is 50Ω and armature resistance is 0.06Ω . Calculate the efficiency and power input when the output is 7.35KW.	07
Q.9	a) With the help of neat diagram, explain the working of three-point starter, with its protection. What are its limitations?	08
	b) A 250V, d.c shunt motor on no load runs at a speed of 1000rpm and takes a current of 5A. The armature and shunt field resistance are 0.2Ω and 250Ω respectively. Calculate the speed when the motor is on-load and is taking a current of 50A. Assume that armature reaction weakens the field by 3%.	07
Q.10	Write short notes. (<u>Any three</u>)	15
	a) Hopkinson's Test	
	b) Construction of D.C. Machine	
	c) Losses in D.C. Machine	
	d) Solid state starters	
	e) Types of Armature windings.	