

Code No: R21025

R10
SET - 1
II B. Tech I Semester Supplementary Examinations, Oct/Nov- 2017
ELECTRICAL MACHINES - I

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
 All Questions carry **Equal** Marks
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1. a) Distinguish between the terms “energy” and “co energy” and derive expression for torque developed in magnetic system. (8M)  
 b) Find expression for the magnetic force developed in a doubly-excited translational magnetic system. (7M)
2. a) Explain different parts of DC Generator and With neat sketches, explain the commutation process in d. c. generator. (8M)  
 b) An 8-pole DC generator has 500 armature conductors and a useful flux of 0.05 Wb. What will be the emf generated, if it is lap connected and runs at 1200 rpm. What must be the speed at which it is to be driven to produce the same emf, if it is wave – wound? (7M)
3. a) With the help of neat sketches, explain the effect of armature reaction on the air gap flux in a d. c. generator. (8M)  
 b) A 4-pole generator has wave wound armature with 822 conductors, and it delivers 100A on full load. If the brush lead is 8 degrees calculate the armature demagnetizing and cross-magnetizing ampere turns per pole. (7M)
4. a) The open circuit characteristic for a DC shunt generator at 800 RPM is as follows: (8M)
 

|               |      |      |      |      |       |       |       |       |
|---------------|------|------|------|------|-------|-------|-------|-------|
| Field Current | 0.2  | 0.4  | 0.6  | 0.8  | 1.0   | 1.2   | 1.4   | 1.6   |
| E.M.F.volts   | 30.0 | 55.0 | 75.0 | 90.0 | 100.0 | 110.0 | 115.0 | 120.0 |

 Determine the critical field resistance at i) 800 RPM and ii) 900 RPM  
 b) Draw and explain the internal and external characteristics of DC shunt and series generators. (7M)
5. a) Why the parallel operation of series generators is unstable. What remedial measures are taken for its successful operation? (8M)  
 b) Two shunt generators each with an armature resistance of  $0.01\Omega$  and field resistance of  $25\Omega$  run in parallel and supply a total load of 3000A. The emfs are respectively 220V and 240V. Calculate the bus bar voltage and output of each machine. (7M)
6. a) Draw different characteristics of DC shunt, series motors and compound motors. (8M)  
 b) Discuss about armature reaction and commutation in DC motors. (7M)
7. a) Discuss about Ward-Leonard system method of Speed Control of D.C. machines in detail. (8M)  
 b) Discuss in brief about 4 – point starter. (7M)
8. a) Explain Swinburn's test on DC machine when machine running as motor and Generator. (8M)  
 b) Discuss detail about Retardation test of a DC motor. (7M)

