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**B.Tech. (EE) (2012 Onwards)/(EE) PT/(Electrical & Electronics)
(2012 Batch)/ (Electrical Engineering & Industrial Control)(2012 to 2017)
(Sem.-5)**

SYNCHRONOUS MACHINES**Subject Code : BTEE-501****M.Code : 70554****Time : 3 Hrs.****Max. Marks : 60****INSTRUCTIONS TO CANDIDATES :**

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A**Write briefly :**

1. What is meant by alternators on infinite bus-bars?
2. What is meant by synchronizing power?
3. What is a synchronous condenser?
4. Why are X_d and X_q value different for salient-pole alternator whereas they are same for smooth rotor machines?
5. Calculate the pitch factor for the following winding: 36 stator slots, 4 poles, coil span 1 to 8.
6. When the load on an alternator is varied, its terminal voltage is also found to change. Why?
7. What conditions must be fulfilled before an alternator can be connected to an infinite bus?
8. Write the application of synchronous motor.
9. What are the constructional features of Hysteresis motor?
10. Compute the distribution factor for a 48 slot, 4 pole, 3-phase alternator.

SECTION-B

11. Draw the combined space and time-phasor diagram for a cylindrical-rotor alternator with armature current lagging the excitation emf. Discuss about various parameters involved in it.
12. In an alternator, a lagging current has the effect of weakening the main field; but in a synchronous motor, the effect of lagging current is to strengthen the main field. Explain.
13. A three-phase 6/8 variable reluctance motor is running at a speed of 1000 rpm. Calculate the time between pulses required to excite the phase windings.
14. Describe, with physical concepts, the hunting phenomenon in synchronous machines. Explain why hunting is objectionable? What are the various causes of hunting? How can it be reduced?
15. How to determine synchronous machine transient reactance and time constant?

SECTION-C

16. A 2300 V, 3-phase, star-connected, 50 Hz synchronous motor operating at normal voltage is excited to give an excitation voltage of 2400 V. Determine the maximum power developed, armature current and power factor under this excitation. Per-phase synchronous impedance is $1.5 + j 21 \Omega$.
17. With regard to synchronous motor V-curves, explain the following :
 - a. There is a bend in the compounding curve obtained by joining the minimum and maximum excitation points.
 - b. Unity p.f. compounding curve has also a bend in it.
18. Show that for alternators running in parallel, the division of load between them is governed mainly by the speed-load characteristics of their prime-movers.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.