

Seat No: \_\_\_\_\_

Enrollment No: \_\_\_\_\_

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B.Tech. Summer 2018 - 19 Examination**

**Semester: 5**  
**Subject Code: 03106303**  
**Subject Name: Power System -I**

**Date: 18/05/2019**  
**Time: 10:30am to 1:00pm**  
**Total Marks: 60**

---

**Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1 Objective Type Questions -) (All are compulsory) (Each of one mark)**

**(15)**

1. The inductance of single phase two wire line is given by \_\_\_\_\_
2. Proximity effect is more in case of \_\_\_\_\_
3. Full form of ACSR \_\_\_\_\_
4. Inductance of transmission line will decrease when
  - i. both GMD and GMR increase
  - ii. both GMD and GMR decrease
  - iii. GMD increase and GMR decrease
  - iv. GMD decrease and GMR increase
5. Suspension type insulators are used for voltages beyond.....kV
6. Advantages of higher transmission voltage is/are
  - i. Power transfer capability of the transmission line is increased
  - ii. Transmission line losses are reduced
  - iii. Area of cross section and volume of the conductor is reduced
  - iv. all of the above
7. Telecommunication lines are transposed to reduce the
  - i. Efficiency
  - ii. radio interference in communication lines
  - iii. voltage level
  - iv. all of the above
8. Bundled conductors in EHV transmission lines
  - i. increase inductance
  - ii. increase capacitance
  - iii. decrease inductance
  - iv. decrease capacitance
9. Skin effect depends on
  - i. Frequency
  - ii. Conductivity
  - iii. relative permeability
  - iv. all of the above
10. Ferranti effect occurs under \_\_\_\_\_ load condition.
11. Which insulator is practically used for railway crossings ?
12. The most commonly used material for insulators of overhead lines is \_\_\_\_\_
13. Per unit of any quantity is defined as \_\_\_\_\_
14. A 10 MVA generator has reactance of 0.2 pu. Find the new reactance value for 50 MVA base?
15. What is the neutral current at balanced condition in 3- $\emptyset$  star connection?

- Q.2** Answer the following questions. (Attempt any three) (15)
- A) Name the important components of an overhead transmission line system.
- B) What are the advantages and disadvantages of H.V transmission?
- C) Draw a neat sketch of the cross-section of the following :
- (i) 3-core belted cable
- (ii) H-type cable
- (iii) S.L. type cable
- D) What is corona? What are the factors which affect corona.

- Q.3** A) A 300 MVA, 20 kV three-phase generators has a sub transient reactance of 20%. The generator supplies a number of synchronous motors over 64-km transmission line having transformers at both ends, as shown in Fig. 1.11. The motors, all rated 13.2kV, are represented by just two equivalent motors. Rated inputs to the motors are 200 MVA and 100 MVA for M1 and M2, respectively. For both motors  $X'' = 20\%$ . The three phase transformer T1 is rated 350 MVA, 230/20 kV with leakage reactance of 10%. Transformer T2 is composed of three single-phase transformers each rated 127/13.2 kV, 100 MVA with leakage reactance of 10%. Series reactance of the transmission line is  $0.5 \Omega/\text{Km}$ . Draw the impedance diagram, with all impedances marked in per-unit. Select the generator rating as base in the generator circuit. (07)



- B) Deduce an approximate expression for sag in overhead lines when supports are at unequal levels. (08)

**OR**

- B) State and prove Kelvin's law for size of conductor for transmission. Discuss its limitations. (08)

- Q.4** A) (07)
- In a 3- $\phi$ , 3-Wire system, the conductor are arranged in a horizontal plane with spacing  $D_{13} = 4m, D_{12} = D_{23} = 2m$ . Conductor are transposed having diameter of 2.5 cm. The ratio of mutual GMD to Self GMD is -----.

**OR**

- A) Derive the inductance of unsymmetrical 3- $\phi$  Line (07)
- B) Show that in a string of suspension insulators, the disc nearest to the conductor has the highest voltage across it. (08)