

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Regular and Supplementary Examination December 2020

Course Code: EE301**Course Name: POWER GENERATION, TRANSMISSION AND PROTECTION**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions, each carries 5 marks.*

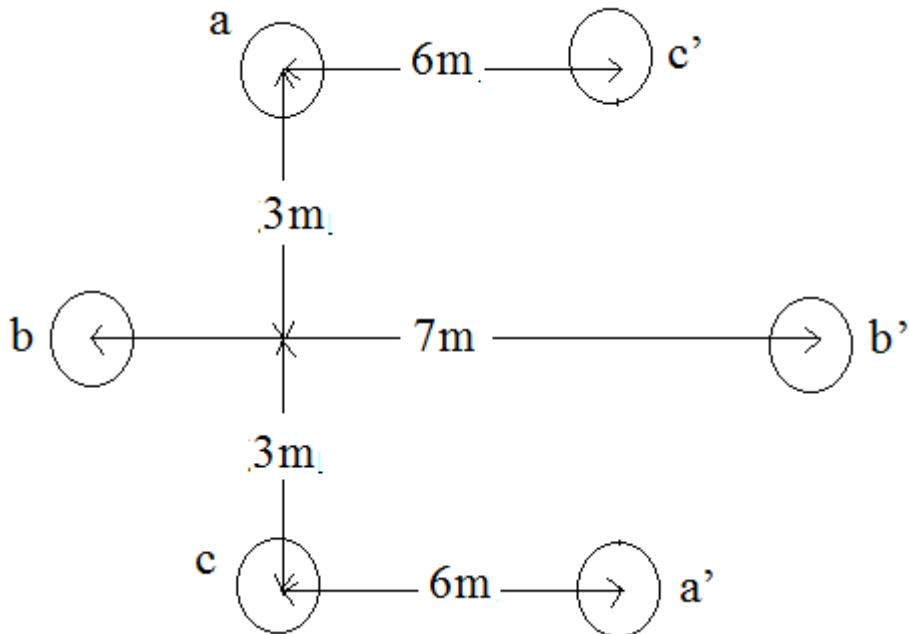
Marks

- | | | |
|---|--|-----|
| 1 | With neat sketch explain the working of a nuclear power station. | (5) |
| 2 | A long transmission line when lightly loaded causes the receiving end voltage to exceed the sending end voltage. Justify with neat phasor diagram. | (5) |
| 3 | Obtain the most economical size of conductor according to Kelvin's law. Also list any 4 limitations of Kelvin's law. | (5) |
| 4 | Explain the construction of underground cables with neat figure. | (5) |
| 5 | Illustrate the significance of dividing the power system into various protection zones. | (5) |
| 6 | Differentiate between breaking capacity and making capacity with necessary equations. | (5) |
| 7 | Explain stator inter-turn protection method of alternator. | (5) |
| 8 | With necessary figures explain the actions performed by a lightning arrester. | (5) |

PART B*Answer any two full questions, each carries 10 marks.*

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| 9 | A power station has to meet the following demand:
Group A: 300 kW between 8 AM and 6 PM
Group B: 200 kW between 6AM and 10 AM
Group C: 50 kW between 6 AM and 10 AM
Group D: 100 kW between 10 AM and 6 PM and then between 6 PM and 6 AM. Plot daily load curve and determine (i) Diversity factor (ii) Units generated per day (iii) Load factor | (10) |
| 10 | a) Explain the significance of transposition in transmission lines. | (4) |
| | b) Find the inductance per phase per km of double circuit three phase line shown in figure. The conductors are transposed and are of radius 0.9cm each. The | (6) |

phase sequence is ABC.



- 11 a) Explain the role of synchronous condensers in improving power factor with phasor diagram. (5)
- b) Derive the ABCD constants of nominal π configuration in transmission lines with necessary figures. (5)

PART C

Answer any two full questions, each carries 10 marks.

- 12 a) “The disc nearest to the conductor has maximum voltage drop across it.” Prove for a 3 disc suspension string insulator with neat figure. (6)
- b) Illustrate the configuration of ACSR conductors and list its main features. (4)
- 13 a) Derive maximum and minimum dielectric stress for a single core cable with neat figure. (5)
- b) Explain the different types of DC links with neat figures. (5)
- 14 a) A transmission line has a span of 375m between level supports. The conductor has an effective diameter of 1.96cm and weighs 0.865kg/m. Its ultimate strength is 6000kg. If the conductor has ice coating of radial thickness 1.27cm and is subjected to a wind pressure of 3.9gm/cm^2 of projected area, calculate sag for a safety factor of 2. Weight of 1cc of ice is 0.91gm. (6)
- b) Explain any four factors affecting corona. (4)

PART D

Answer any two full questions, each carries 10 marks.

- 15 a) With neat figure explain the following: (4)
(a) Arc Voltage (b) Restriking Voltage (c) Recovery Voltage
b) Explain the working principle of electromagnetic induction type relays. (6)
- 16 a) Explain the basic protection scheme employed using microprocessor. (5)
b) With neat figure explain principle of operation of thermal relays. (5)
- 17 a) An electric train runs between two sub-stations 6km apart maintained at voltages 600V and 590V respectively and draws a constant current of 300A while in motion. The track resistance of go and return path is $0.04\Omega/\text{km}$. Calculate: (7)
(i) The point along the track where minimum potential occurs
(ii) The current supplied by the two sub-stations when the train is at the point of minimum potential.
- b) Write short notes on insulation coordination. (3)
