Printed Pages: 02 **Sub Code: KEE-501**

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B. TECH.
(SEM V) THEORY EXAMINATION 2022-23
POWER SYSTEM-I

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2x10 = 20

(a) List the key features of primary and secondary distribution systems in the power system.
(b) Explain diversity factor in power systems.
(c) What will be the effect of line capacitance for lagging load in the medium transmission line.
(d) Why the line capacitance is neglected in short transmission lines.
(e) Explain the effect on sag of transmission line if the height of tower is increased?
(f) Explain the factors affecting sag of an overhead transmission line.
(g) Classify various type of supports used in power transmission lines.
(h) Describe the uses and advantages of bundled conductors.
(i) Summarize why metallic sheath is provided in underground cables.
(j) List the different types of insulating materials used in underground cables.

SECTION B

2. Attempt any *three* of the following: 10x3 = 30

(a) A plant having daily energy production and plant factor is 1296 MWhr and 50% respectively. Calculate the maximum rating of the power plant.
(b) Write short note on the factors affecting the "Corona" losses.
(c) Show that the string efficiency of a string of suspension insulators is dependent on number of discs in string.
(d) Show that the inductance of a bundle conductor line is less than that of the line with one conductor per phase with mathematical expression.
(e) Explain the comparisons between overhead lines versus underground cables.

SECTION C

3. Attempt any *one* part of the following: 10x1 = 10

(a) Explain in detail the nuclear reaction theory and working principle of a nuclear power station with plant layout.
(b) A hydro-electric power station has a reservoir of area 2·4 square kilometres andcapacity 5×10^6 m^3. The effective head of water is 100 metres. The penstock, turbine and generationefficiencies are respectively 95%,90% and 85%.
(i) Calculate the total electrical energy that can be generated from the power station.
(ii) If a load of 15,000 kW has been supplied for 3 hours, find the fall in reservoir level.

4. Attempt any *one* part of the following: 10 x1 = 10

(a) An overhead transmission line operates at 220 kV between phases at 50 Hz. The conductors are arranged in a 5 m delta formation. Calculate the maximum diameter of the conductor that can be used for no corona loss under fair weather conditions. Assume an air density factor of 0.95 and an irregularity factor of 0.85. The critical voltage is 230 kV. Also, find the power loss under stormy weather conditions.

(b) Drive expression for voltage regulation and efficiency for short transmission line

5. Attempt any *one* part of the following: 10x1 = 10

(a) Explain the calculation procedure of maximum sag of a transmission line at equal supports including wind pressure loading.

(b) An overhead line has the following data:
Span length 160 metres, conductor dia 0.95 cm, weight per unit length of the conductor0.65 kg/metre. Ultimate stress 4250 kg/cm^2, wind pressure 40 kg/m^2 of projected area. Factor of safety 5.Calculate the sag.

6. Attempt any *one* part of the following: 10x1 = 10

(a) Derive an expression for the capacitance per unit length of a 3-phase line completely transposed.

(b) Describe the Inductance calculation procedure of three-phase double-circuit line with Symmetrical spacing (hexagonal).

7. Attempt any *one* part of the following: 10x1 = 10

(a) Explain the grading method of underground cables with mathematical expressions.

(b) Explain with a neat sketch, the construction of a 3-core belted type cable.