

Roll No:

BTECH (SEM V) THEORY EXAMINATION 2024-25 POWER SYSTEM-I

TIME: 3 HRS

M.MARKS: 70

Note: Attempt all Sections. In case of any missing data, choose suitably.

SECTION A

1. Attempt *all* questions in brief.

$2 \ge 07 = 14$

| Q no. | Question | СО | Level |
|-------|---|-----|-------|
| a. | Describe the renewable and non-renewable energy resources. | CO1 | K1 |
| b. | Define these terms: (i) Demand Factor (ii) Diversity Factor, | CO1 | K2 |
| c. | What do you understand by single line diagram in power system. | CO2 | K2 |
| d. | Define the term per unit system and also explain their significance | CO2 | K3 |
| e. | Describe the factors affecting sag of an overhead transmission lines. | CO3 | K2 |
| f. | What do you mean by self GMD & mutual GMD? | CO4 | K2 |
| g. | Explain the term insulation and also explain the types of insulating materials. | CO5 | K2 |

SECTION B

$07 \ge 3 = 21$ 2. Attempt any three of the following: Q no. Question CO Level Explain the basic structure of smart grid and also explain the importance a. CO1 K2 of IT equipment in the power system. What are corona effects? Explain the factors which affects the corona b. CO2 K2 loss and how it is reduced? Each conductor of a three-phase overhead line is suspended from a cross c. arm of steel tower by a string of 4 suspension insulators. The voltage CO3 K4 across the second unit is 14.2 KV and across the third 20 KV. Find the voltage between the conductors and the string efficiency. Derive an expression for capacitance of a symmetrical three phase lines. d. CO4 K3 Draw the layout and explain the oil-filled cables. CO5 K2 e.

SECTION C

3. Attempt any *one* part of the following:

$07 \ge 1 = 07$

| Q no. | Question | CO | Lev |
|-------|--|-----|-----|
| | | | el |
| a. | The yearly load duration curve of a power plant is a straight line. The maximum load is 500 MW and the minimum load is 400 MW. The | | |
| | capacity of the plant is 750 MW. Find (a) Plant Capacity factor (b) Load | CO1 | K4 |
| | Factor (c) Utilization factor (d) Reserve Capacity. | | |
| b. | Draw the block diagram and explain the working of thermal power plants. | CO1 | K2 |



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4. Attempt any *one* part of the following:

$07 \ge 1 = 07$

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 $07 \times 1 = 07$

| Q no. | Question | СО | Level |
|-------|--|-----|-------|
| a. | Compare the volume of conductor materialrequired for a d.c. 3-wire system and 3-phase, 3-wire system on the basis of equalmaximum potential difference between one conductor and earth. Make suitable assumptions | CO2 | K3 |
| b. | Sketch the T & π model of medium transmission lines and explain their parameters. | CO2 | K3 |

5. Attempt any *one* part of the following:

Q no.QuestionCOLevela.Explain the methods of calculating sag and tension of overhead
transmission lines at unequal level of ground.CO3K4b.What are insulators? Explain their types and applications with neat and
clean diagram.CO3K3

6. Attempt any *one* part of the following:

| Q no. | Question | СО | Level |
|-------|---|----------------------------|-------|
| a. | A three phase 50 Hz line consists of three conductors each of diameter | $\overline{\overline{\ }}$ | |
| | 21 mm. The spacing between the conductors is as follows: | CO4 | КЛ |
| | A-B = 3 m, B-C = 5 m, C-A = 3.6 m. | 004 | 174 |
| | Find the inductance and inductive reactance per phase per km of the line. | | |
| b. | Derive an expression for the inductance of symmetrical three phase line. | CO4 | K3 |
| | What is meant by the term equivalent spacing? State its significance. | 04 | K3 |

7. Attempt any *one* part of the following:

$07 \ge 1 = 07$

| Q no. | Question | CO | Level |
|-------|--|-----|-------|
| a. | Explain in detail grading of the overhead cables. | CO5 | K2 |
| b. | Determine the overall diameter of a single core cable and its most economical diameter when working on a 3 phase 275 KV system. The maximum permissible stress in the dielectric is not to exceed 15 KV/mm | CO5 | K4 |
| | 09-50 | | |

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