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QUESTION BANK (DESCRIPTIVE)

Subject with Code : EPG&TS(**19EE0211**) **Course & Branch**: B.Tech - EEE

Year & Sem: III-B.Tech & I-Sem **Regulation:** R19

UNIT –I

THERMAL POWER GENERATING SYSTEMS

1. Draw the block diagram of thermal power station (TPS) showing paths of coal, steam, water, air, ash and flue gases and explain principle of operation briefly.[L1][CO1][10M]
2. What factors are taken into account while selecting the site for a thermal power station?[L1][CO1][10M]
3. Explain the function of the following in thermal power plant and explain the principle of operation of each. a)economizer b)Electrostatic precipitator c)condenser d)super heater e) Cooling tower.[L2][CO1][10M]
4. Explain the important components of a steam power station.[L2][CO1][10M]
5. (a) Mention the merits and demerits of steam power plant.[L2][CO1][5M]
   b) Discuss the merits and demerits of a hydro-electric plant.[L4][CO2][5M]
6. Draw a neat schematic diagram of a hydro-electric plant and explain the functions of various components.[L1][CO2][10M]
7. Write a short note on (i) Surge tank (ii) Penstock(iii) Forebay [L1][CO2][10M]
8. a) Explain the function of chimney and precipitator[L2][CO1][5M]
   b) What factors are taken into account while selecting the site of hydro electric power plant?[L1][CO2][5M]
9. How hydro electric power plants are classified?[L1][CO2][10M]
10. a) What is the purpose of forced draught fan?[L1][CO1][2M]
    b) What is function of economizer?[L1][CO1][2M]
    c) Define thermal efficiency.[L1][CO1][2M]
    d) What is the purpose of surge tank?[L1][CO2][2M]
    e) What is meant by Run-off?[L1][CO2][2M]

UNIT –II

NUCLEAR POWER GENERATING SYSTEMS

1. Discuss the following components in nuclear power station briefly.
   (a) Moderator (b) Control rods(c) Reflector(d) Coolant(e) Nuclear reactor[L2][CO2][10M]
2. a) What are the classification of nuclear reactors?[L1][CO2][5M]
   b) Explain about the boiling water reactor[L2][CO2][5M]
3. Draw the schematic diagram of a nuclear power station and discuss its operation.

[L1][CO2][10M]

4. a) Explain the principle of operation Nuclear Reactor. [L2][CO2][5M]
   b) Explain about Nuclear Fission and Chain reaction. [L2][CO2][5M]
5. Compare thermal, hydro and nuclear power plants on the basis of technical, mechanical and economical aspects. [L3][CO2][10M]
6. Explain the main components of a nuclear reactor and discuss its operation.[L2][CO2][10M]
7. a) Explain about the fast breeder reactor[L2][CO2][5M]
   b)What are the factors considered while selecting the site for nuclear power plant? [CO2][L1][5M]
8. Write short note on a) FBR b) BWR c) PWR[L1][CO2][10M]
9. What are the main parts of a nuclear power plant? Explain. [L1][CO2][10M]
10 Write a short note on following

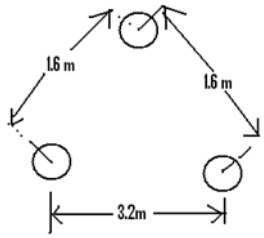
(i) Chain reaction (ii) Nuclear fission (iii) List demerits of a nuclear power plant.[L1][C02][10M]

UNIT –III

TRANSMISSION LINE PARAMETERS

1. (a) Find the expression for inductance of a two-wire single phase transmission line[L4] [CO3][5M]

   (b) Determine the inductance of a three phase line operating at 50Hz and conductors are arranged as follows. The conductor diameter is 1cm. [L6][CO3][5M]



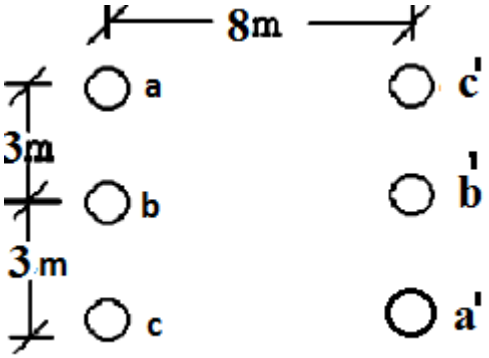
fig

2. (a) What is Skin effect? Explain. [L1][CO3][3M]

   (b) Determine the inductance/phase/km of a double circuit 3-phase line. The radius of each conductor is 20mm and the conductors are placed on the circumference of an imaginary circle at a distance of 7m forming a regular hexagonal figure. [L6][CO3][7M]

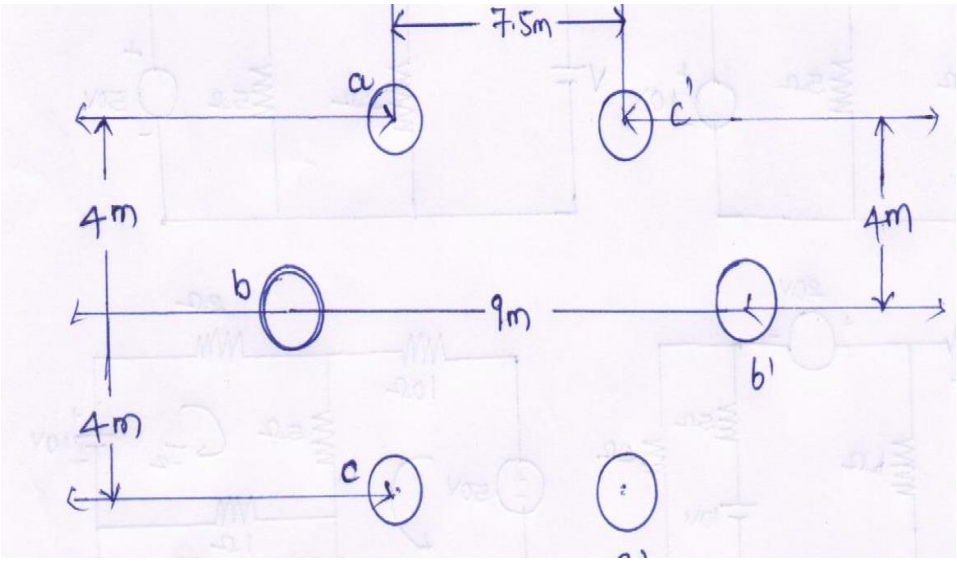
3. (a) Derive the expression for the inductance of a three phase double circuit flat vertical spacing configuration. [L3][CO3][5M]

   (b) Calculate the inductance for a three phase double circuit line as shown in figure. Diameter of each conductor is 1.5cm



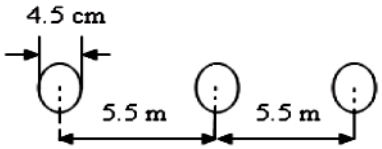
4. Deduce an expression for line neutral capacitance for a three phase overhead transmission line when the conductors are (i) symmetrically placed (ii) Asymmetrically placed but transposed. [L3][CO3][10M]

5. Determine the capacitance and the charging current per km of a transposed double circuit three-phase line operates at 220kv, dia of conductor is 2.5cm as shown in figure.
[L2][CO3][10M]



6. (a) Derive the expression for flux linkages of one conductor in a group of n-conductors [L3][CO3][5M]

(b) Determine the inductance per km per phase of a single circuit 20kVline of given configuration as shown in fig. The conductors are transposed and have a diameter of 4.5cm.



[L2][CO3][5M]

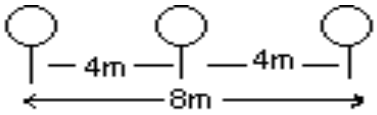
7. (a) Derive the expression for the capacitance of a single phase two wire line.[L3][CO3][5M]

   (b) A single phase transmission line has two parallel conductors 3m apart, radius of each conductor being1cm. Calculate the capacitance of the line per km. [L3][CO3][5M]

8. Show that the capacitance per phase per meter of a double circuit regular hexagonal spacing transmission line is $c = \frac{4\pi\varepsilon_0}{\ln\frac{\sqrt{3}\,D}{2r}}$ F/meter/conductor, where D is conductor spacing and r is the radius of the conductor. [L5][CO3][10M]

9. (a) Derive an expression for the inductance per phase for a 3-phase overhead transmission line when conductors are symmetrically placed. [L3][CO3][5M]

   (b) Calculate the inductance per phase of a three –phase transmission line as shown in following fig. The radius of the conductor is 0.5cm. The lines are un-transposed. [L2][CO3][5M]



10.Write a short note on(i) ACSR conductor (ii) Bundled conductors (iii) Standard conductors[L1][CO3][10M].

UNIT –IV

PERFORMANCE OF TRANSMISSION LINES

1. Derive the ABCD constants of medium transmission line by using nominal-T and nominal Π methods. [L2][CO4][10M]
2. A 100km long,3-phase,50Hz transmission line has following line constants: Resistance/ph/km=0.1ohm,Reactance/ph/km=0.5ohm, Susceptance/ph/km=$10*10^{-6}$siemen.If the line supplies load of 20MW at 0.9 p.f lagging at 66KV at the receiving end, calculate(i) Sending end power factor (ii) % regulation (iii)Transmission efficiency. By using nominal Π method. [L3][CO4][10M]

3. An overhead 3-phase transmission line delivers 400KW at 11KV at 0.8 pf lagging. The resistance and reactance of earth conductors are 1.5Ω and 4Ω per phase respectively. Determine (i) The sending end voltage.(ii) percentage regulation.(iii) Transmission efficiency. [L2][CO4][10M]

4. Evaluate the generalized circuit constants for (i) short transmission line (ii) medium line nominal T method (iii) medium line nominal Π method. [L5][CO4][10M]
5. A 3-phase, 50Hz overhead transmission line 100km long has the following constant: Resistance/km/phase= 0.1 ohm Inductive reactance/km/phase= 0.2 ohm Capacitive susceptance/km/phase = 0.04 x 10^{-4} siemen Determine (i) sending end current (ii) sending end voltage (iii) sending end power factor (iv) transmission efficiency when supplying a balanced load of 10,000kW at 66kV, 0.8 power factor lagging. Use nominal-T method.
6. Derive expression for voltage regulation of medium transmission lines using nominal -T method with equivalent circuit and necessary phasor diagram. [L2][CO4][10M]
7. Derive expressions for sending end voltage and sending end current for along transmission line using rigorous method. [L3][CO4][10M]
8. Derive expression for voltage regulation of medium transmission lines using nominal -π method with equivalent circuit and necessary phasor diagram. [L2][CO4][10M]
9. (a) Prove the relation AD-BC=1 by considering a two terminal pair network for nominal T-method. [L5][CO4][5M]

   (b) What is a surge impedance loading? [L1][CO4][5M]
10. Derive equivalent mathematical expression for voltage regulation of a short transmission line with the help of phasor diagram. [L2][CO4][10M]

UNIT –V

MECHANICAL DESIGN OF TRANSMISSION LINES

1. (a). Explain various types of insulators with neat diagrams and compare them? [L2][CO5][5M]

   (b). A three phase overhead line is suspended by a suspension type insulator, which Consists of three units. The potential across top unit and middle unit are 12 kv and 18 kv Respectively. Calculate: (i) the ratio of capacitance between pin and earth to the self Capacitance of each unit (ii).The line voltage and (iii) String efficiency. [L5][CO4][2M]
2. (a) What are the factors affecting corona? And derive the expressions for critical disruptive and visual critical voltage [L1][[L2][CO6][5M]

(b) Determine the corona characteristics of a 3-phase line 160km long, conductor diameter 1.036cm, 2.44m delta spacing, air temperature 26.67oC, altitude 2440m, corresponding to an approximate barometric pressure of 73.15cm of Mercury, operating voltage 110kv at 50Hz. Assume data if required.(irregularity factor etc.) [L][CO6][5M]

3. (a) Derive the expression for sag and tension when the supports are at unequal heights. [L2][CO6][5M]

   (b) An overhead transmission line at a river crossing is supported from two towers at heights of 40m and 90 m above water level. The horizontal distance between the towers being 400m.If the allowable tension is 2000kg, find the clearance between the conductor and water at a point mid-way between the towers. Weight of conductor is 1kg/m [L3][CO6][5M]

4. (a) A string of six insulator units has a self capacitance is equals to 10 times the pin to earth capacitance. Find (i) voltage distribution across various units as a percentage of total voltage across the string. (ii) the string efficiency. [L3][CO5][5M]

   (b) A certain 3-phase equilaterally spaced transmission line has a total corona loss of 55KW at 110 KV and a loss of 110KW at 120 KV. What is the disruptive critical voltage between lines? What is the corona loss at 125KV? [L1][CO6][5M]

5. (a) Each line of a three phase system is suspended by a string of three identical insulators of self capacitance of C farad. The shunt capacitance of connecting metal work of each insulator is 0.2C to earth and 0.1C to line. Calculate the string efficiency of the system and also calculate string efficiency if a guard –ring increases the capacitance to the line of metal work of the lowest insulator to 0.3C[L5][CO5][5M]

   (b) What do you understand by grading of insulators? Explain. [L1][CO5][5M]

6. (a) Write a short note on (i) effect of Wind and ice loading on calculation of sag and (ii) sag-template [L1][CO6][5M]

   (b) An overhead line erected across a span of 250 meters on level supports. The conductor has a diameter 1.4cm and has a dead weight of 1.9kg/m. The line is subjected to wind pressure of 37.8 kg/m^2 of projected area. The radial thickness of ice is 1.3cm.calculate (i) the sag in an inclined direction (ii) the sag in vertical direction. Assume maximum working stress 1050kg per sq. cm. One cubic meter of ice weight 913.5kg. [L5][CO6][5M]

7. (a) Explain about the improvement of string efficiency by grading of units and guard ring[L2][CO5][5M]

   (b) An overhead line has a span of 150 m between level supports. The conductor has a cross sectional are of 2cm^2. The ultimate strength is 5000kg/cm^2 and safety factor is 5. The specific

gravity of the material is 8.9gm/cm^3. The wind pressure is 1.5kg/m. calculate the height of the conductor above the ground level at which it should be supported if a minimum clearance of 7 m is to be left between the ground and the conductor. [L5][CO6][5M]

8. (a) Derive the expression for sag for equal supports[L2][CO6][5M]

   (b) Each conductor of a three phase over head line is suspended from a cross arm of a steel tower by a string of 4 suspension insulators. The voltage across the second unit is 14.2kv and across the third 20kv. Find the voltage between the conductors and the string efficiency. [L3][CO5][5M]

9. (a) Explain the concept and phenomenon of corona. [L2][CO6][5M]

   (b) Explain the advantages and disadvantages of corona[L2][CO6][5M]

10. a) Define string efficiency[L1][CO5][2M] .

    b) What is puncture and flash over in an insulators? [L1][CO5][2M]

    c) Define critical disruptive voltage and visual critical voltage also write the formulae [L1][CO5][2M]

    d) Define sag. Write the formula for sag. And draw the unequal supports structure. [L1][CO6][2M]

    e) What is local corona? [L1][CO6][5M]

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