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Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125



BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Tech.(EE)-2024

Course Name – Power System I

Course Code - BTE40109

(Semester IV)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Identify solar PV cell efficiency decreases mainly due to increase in
 - a) Solar irradiance
 - b) Cell area
 - c) Operating temperature
 - d) Series resistance
- (ii) Select the plant most suitable for continuous base-load operation is
 - a) Diesel power plant
 - b) Hydroelectric power plant
 - c) Nuclear power plant
 - d) Gas turbine power plant
- (iii) Identify the component of the hydro-electric power station which carry water to the turbines
 - a) Penstocks
 - b) Spillways
 - c) Surge tank
 - d) Headworks
- (iv) Choose the condition when breakdown of a solid dielectric occurs.
 - a) Temperature decreases
 - b) Electric field exceeds dielectric strength
 - c) Thickness increases
 - d) Resistance becomes infinite
- (v) Identify the effect of corona
 - a) increased energy loss
 - b) increased reactance
 - c) increased inductance
 - d) all of these
- (vi) Choose the factors on which the capacitance of a cable depends
 - a) length of the cable
 - b) relative permeability of the dielectric used in the cable
 - c) ratio of sheath diameter and core diameter
 - d) All of the Above
- (vii) Choose the method by which breakdown of insulation of cable may be avoided
 - a) using insulation layers of different dielectrics
 - b) by using intersheath
 - c) either a or b
 - d) none of these
- (viii) Choose the correct meaning of capacitance grading of cables

- a) use of dielectrics in different concentration
b) introduction of capacitance at various lengths of the cable to counter the effect of inductance
c) use of dielectrics of different permittivities
d) grading according to capacitance per km length of the cable
- (ix) Select the coolant in a nuclear reactor is used to
a) Absorb neutrons
b) Slow down neutrons
c) Transfer heat from core
d) Control chain reaction
- (x) Choose the effect of temperature rise in overhead lines
a) Increase in the sag and decrease in the tension
b) Decrease in the sag and increase in the tension
c) Increase both
d) Decrease both
- (xi) Identify which one of the following is a feed water heater
a) superheater
b) air-preheater
c) economiser
d) none of these
- (xii) Choose the factor on which the string efficiency of a string of suspension insulators depends
a) Size of the insulators
b) Number of discs in the string
c) Size of tower
d) All of the these
- (xiii) The radius of a conductor is 5 cm. Choose the value of its GMR
a) 0.039 m
b) 0.039 cm
c) 0.7788 m
d) 0.7788 cm
- (xiv) Choose for which type of line transposition is carried out
a) single phase line
b) three phase symmetrical configuration
c) three phase unsymmetrical configuration
d) all of these
- (xv) Calculate : if Radius 1cm and $D=2m$, Inductance per conductor per meter.
a) 1.11×10^6 H/m
b) 1.11×10^4 H/m
c) 1.11×10^2 H/m
d) 1.11×10^9 H/m

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Write a short note on Corona. (3)
3. Write the factors on which the string efficiency of an insulator depends. (3)
4. Explain the working of gas turbine power plant with necessary block diagram. (3)
5. Discuss about the Transposition of Transmission Line. (3)
6. Calculate the maximum length for a single phase transmission line having copper conductors of 0.775 sq cm cross section over which 200 kW at unity power factor at 3300 V are to be delivered. The transmission efficiency is 90 %. Take specific resistance of copper as 1.725 micro ohm cm. (3)

OR

A balanced 3 phase load is supplied by means of a 132 kV transmission line having series impedance of $(20 + j52)$ ohms and shunt admittance of 0.000315 S. Evaluate the ABCD parameters using nominal T method. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Evaluate the A, B, C, and D parameters of a 3 phase, 50Hz, 80 km transmission line with a series impedance $90.15 + j0.78$ ohm per km and a shunt capacitance $(j5 \times 10^{-6})$ mho per km. Apply nominal T configuration. (5)

8. Discuss about the function of FD and ID fan in thermal power plant. (5)
9. Determine the classification of cables with respect to operating voltage. (5)
10. A 3 phase, 50 Hz, 132 kV overhead line has conductors placed in a horizontal plane 4 m apart. (5)
Conductor diameter is 2 cm. If the line length is 100 km, calculate the charging current per phase assuming complete transposition.
11. Explain briefly about reactor in nuclear power plant. (5)
12. A transmission line has a span of 150 m between level supports. The conductor has a cross-sectional area of 2 sqcm. The tension in the conductor is 2000 kg. If the specific gravity of the conductor material is 9.9 gm/cm³ and wind pressure is 1.5 kg/m length, Evaluate: the sag and vertical sag. (5)

OR

- A transmission line has a span of 200 metres between level supports. The conductor has a cross-sectional area of 1.29 cm², weighs 1170 kg/km and has a breaking stress of 4218 kg/cm². Evaluate the sag and vertical sag for a safety factor of 5, allowing a wind pressure of 122 kg per square metre of projected area. (5)

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