EDO STATE POLYTHENIC, USEN

1ST EXAMINATION,

ND 2 {ELECTRICAL POWER 1 (EEC 232)}

60 MINUTES

1. A hydro-electric generating station is supplied from a reservoir of capacity 5 *10^6 cubic metres at a head of 200 metres. Find the total energy available in kWh if the overall efficiency is 75%.
   (A) 2.044 x 10^6 kWh
   (B) 2.44 x 10^6 kWh
   (C) 2.404 x 10^6 kWh
   (D) 2.442 x 10^6 kWh

2. It has been estimated that a minimum run off of approximately 94 m3/sec will be available at a hydraulic project with a head of 39 m. Determine the firm capacity. Assume the efficiency of the plant to be 80%.
   (A) 38,770kW
   (B) 28,770kW
   (C) 22.8770kW
   (D) 48,770kW

3. It has been estimated that a minimum run off of approximately 94 m3/sec will be available at a hydraulic project with a head of 39 m. Determine the yearly gross output. Assume the efficiency of the plant to be 80%.
   (A) 352 x 10^6 kWh
   (B) 252 x 10^6 kWh
   (C) 2.522 x 10^6 kWh
   (D) 0.352 x 10^6 kWh

4. A hydro-electric station has an average available head of 100 metres and reservoir capacity of 50 million cubic metres. Calculate the total energy in kWh that can be generated, assuming hydraulic efficiency of 85% and electrical efficiency of 90%.
   A. [10·23 x 10^6 kWh]
   B. [10·43 x 10^6 kWh]
   C. [10·42 x 10^6 kWh]
   D. [10·423 x 10^6 kWh]

5. Calculate the continuous power that will be available from hydroelectric plant having an available head of 300 meters, catchment area of 150 sq. km, annual rainfall 1·25 m and yield factor of 50%. Assume Penstock, turbine and generator efficiencies to be 96%, 86% and 97% respectively. If the load factor is 40% .
   A. [765 kW]
   B. [7005 kW]
   C. [1065 kW]
   D. [7065 kW]

6. A hydroelectric plant has a reservoir of area 2 sq. kilometres and of capacity 5 million cubic meters. The net head of water at the turbine is 50 m. If the efficiencies of turbine and generator are 85% and 95% respectively, calculate the total energy in kWh that can be generated from this station.

A. [6·6 x 10^5 kWh]
B. [10·5 x 10^5 kWh]
C. [2·35 x 10^5 kWh]
D. [5·5 x 10^5 kWh]

7. It has been estimated that a minimum run-off of approximately 94 m^3/sec will be available at a hydraulic project with a head of 39 m. Determine the firm capacity**.**

A. [3600 kW]
B. [300 kW]
C. [600 kW]
D. [36 kW]

8. A hydroelectric power station is supplied from a reservoir having an area of 50 km2 and a head of 50 m. If overall efficiency of the plant is 60%, find the rate at which the water level will fall when the station is generating 30,000 kW.

A. [7·7 mm/hour]
B. [7·337 mm/hour]
C. [7·37 mm/hour]
D. [7 mm/hour]

9. A hydro-electric plant has a catchment area of 120 square km. The available run off is 50% with annual rainfall of 100 cm. A head of 250 m is available on the average. Efficiency of the power plant is 70%. Find the average power produced. Assume a load factor of 0.6.

A. [66 kW]
B. [3266 kW]
C. [36 kW]
D. [32 kW]

10. A hydroelectric plant has a reservoir of area 2 sq. kilometres and of capacity 5 million cubic meters. The net head of water at the turbine is 50 m. If the efficiencies of turbine and generator are 85% and 95% respectively, If the total energy in kWh that can be generated from this station is 5.5 * 10^5 kWh and a load of 15000 kW has been supplied for 4 hours, find the fall in reservoir.

A. [20·8 cm]
B. [17·8 cm]
C. [27·8 cm]
D. [32·8 cm]

11. It has been estimated that a minimum run-off of approximately 94 m^3/sec will be available at a hydraulic project with a head of 39 m. Determine the yearly gross output.

A. [315·36 x 10^6 kWh]
B. [5·36 x 10^6 kWh]
C. [3·36 x 10^6 kWh]
D. [0·36 x 10^6 kWh]

12. A hydro-electric plant has a catchment area of 120 square km. The available run off is 50% with annual rainfall of 100 cm. A head of 250 m is available on the average. Efficiency of the power plant is 70%. Find the capacity of the power plant. Assume a load factor of 0.6.

A. [54 kW]

B. [5443 kW]

C. [8448 kW]

D. [543 kW]

13. An atomic power reactor can deliver 300 MW. If due to fission of each atom of $_{92}U^{235}$, the energy released is 200 MeV, calculate the mass of uranium fissioned per hour.

A. [13·17g]

B. [1·17g]

C. [3·17g]

D. [13·7g]

14. What is the power output of a $_{92}U^{235}$ reactor if it takes 30 days to use up 2 kg of fuel? Given that energy released per fission is 200 MeV and Avogadro's number = $6{\cdot}023 \times 10^{26}$ per kilo mole.

A. [6·2 MW]

B. [3·2 MW]

C. [63·2 MW]

D. [69·2 MW]

15. Cooling towers are used where .....

A. [water is not available in sufficient quantity]

B. [water not available in sufficient quantity]

C. [oil is not available in sufficient quantity]

D. [oil not available in sufficient quantity]

16. In a hydro-electric plant, spillways are used .....

A. [to discharge surplus water on the downstream side of dam]

B. [to discharge surplus oil on the downstream side of dam]

C. [to discharge surplus diesel on the downstream side of dam]

D. [to discharge surplus fuel on the downstream side of dam]

17. For high head hydro-electric plants, the turbine used is .....

A. [Tarapur]

B. [penstock]

C. [reaction]

D. [pelton wheel]

18. Surge tank is provided for the protection of .....

A. [Tarapur]

B. [penstock]

C. [reaction]

D. [pelton wheel]

19. Of all the plants, minimum quantity of fuel is required in ..... plant.

A. [Tarapur]
B. [hydro power.]
C. [reaction]
D. [nuclear power.]

20. The cost of fuel transportation is minimum in ..... plant.

A. steam powe
B. hydro-electric
C. nuclear power
D. non

21. The cheapest plant in operation and maintenance is ..... plant.

A. diesel power
B. hydro-electric
C. steam power
D. non

22. The most simple and clean plant is ..... plant

A. steam power
B. hydro-electric
C. nuclear power
D. non

23. The generation of power by …… generator is based on the fundamental laws of electro-magnetic induction

A. [MHD]
B. [HD]
C. [NHD]
D. [All]

24. The area under the daily load curve gives .....

A. [units generated in the night]
B. [units generated in the day and night]
C. [all]
D. [units generated in the day]

25. The value of demand factor is ..... than 1.

A. [more]
B. [less]
C. [non]
D. [all]

26. Annual load factor is determined from ..... load curve.

A. [daily]
B. [monthly]
C. [annual]
D. [All]

27. The maximum kVA demand of the consumer is ..... proportional to power factor.

A. inversely

B. directly

C. partial

D. joint

28. Area under the daily load curve divided by 24 gives ..... .

A. average load

B. maximum demand

C units generated

D. all of the above

29. Fixed cost of electrical energy ..... maximum demand.

A. depends upon

B. does not depend upon

C units generated

D. all of the above

30. For the same maximum demand, if load factor is decreased, the cost of energy is .....

A. increased

B. decreased

C. not affected

D. all of the above

31. Average load is ..... if the load factor increases.

A. increased

B. decreased

C. non

D. all of the above

32. The annual, ... cost is due to the annual cost of fuel, oil, taxation, wages and salaries to the operating staff.

A. running

B. fixed

C. joint

D. all of the above

33. A consumer whose load conditions do not deviate from ideal one should be charged at ..... rate than the one whose load conditions change appreciably.

A. lower

B. higher

C. both

D. non .

34. A consumer who consumes more electrical energy should pay ..... fixed charges per unit.

A. less

B. more

C. both

D. non

35. The ideal tariff for any type of consumer is ..... tariff.

A. two-part

B. three-part

C. four-part

D. five-part

Lecturer in charge: *Engr. Osadebamwen Kenneth Ojo*

EDO STATE POLYTHENIC, USEN

1ST EXAMINATION, 2018/2019 SESSION

ND 2 {ELECTRICAL CIRCuIT ThEoRy1 (EEC 239)}

Answer question 1 And Any other 4

120miNUTES

1. A.c. sources of $100\angle 0^{\circ}$V and internal resistance 25Ω, and $50\angle 90^{\circ}$V and internal resistance 10Ω, are connected in parallel across a 20Ω load. Determine using the superposition theorem, the current in the 20Ω load and the current in each voltage source.

2. Use the superposition theorem to determine the current in the 4Ω resistor of the network shown in Figure below.

3. Define
   (a) Superposition theorem
   (b) Kirchhoff voltage law
   (c) Thévenin's theorem
   (d) Norton's theorem

4. In an electrical circuit the total impedance Z_T is given by

$$Z_T = \frac{Z_1 Z_2}{Z_1 + Z_2} + Z_3$$

   Determine Z_T in $(a + jb)$ form, correct to two decimal places, when $Z1 = 5 - j\,3$, $Z2 = 4 + j7$ and $Z3 = 3.9 - j\,6.7$

5. Determine the values of the resistance and the series-connected inductance or capacitance for each of the following impedances: (a) [12 + j5]Ω (b) – j40Ω (c) $30\angle 60\Omega$ (d) $2.20 \times 10^{6}\angle -30\Omega$. Assume for each a frequency of 50Hz.
6. A 3μF capacitor is connected to a supply of frequency 1kHz and a current of $2.83\angle 90^{\circ}$ A flows. Determine the value of the supply p.d.
7. Determine the admittance, conductance and susceptance of the following impedances: (a) –j5Ω, (b) [25 +j40]Ω, (c) [3 – j2]Ω. (d) $50\angle 40\Omega$.

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EDO STATE POLYTHENIC, USEN

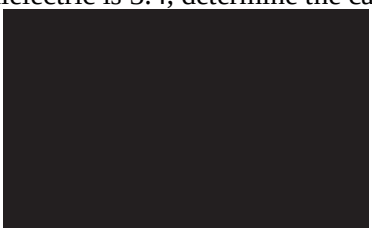
1ST EXAMINATION, 2018/2019 SESSION

hND 2 {electromagnetic field theory (EEC 431)}

Answer 4 question {120miNUTES}

1. A field plot between two metal plates is shown in Figure below. The relative permeability of the dielectric is 2.8. Determine the capacitance per metre length of the system.

2. A field plot for a cross-section of a concentric cable is shown in Figure below. If the relative permeability of the dielectric is 3.4, determine the capacitance of a 100m length of the cable.



3. A coaxial cable has an inner core radius of 0.5mm and an outer conductor of internal radius 6.0mm. Determine the capacitance per metre length of the cable if the dielectric has a relative permittivity of 2.7
4. A single-core concentric cable has a capacitance of 80 pF per metre length. The relative permittivity of the dielectric is 3.5 and the core diameter is 8.0mm. Determine the internal diameter of the sheath.
5. A concentric cable has a core diameter of 32mm and an inner sheath diameter of 80mm. The core potential is 40kV and the relative permittivity of the dielectric is 3.5. Determine (a) the capacitance per kilometre length of the cable, (b) the dielectric stress at a radius of 30mm, and (c) the maximum and minimum values of dielectric stress.
6. A single-core concentric cable is to be manufactured for a 60kV, 50Hz transmission system. The dielectric used is paper which has a maximum permissible safe dielectric stress of 10MV/m r.m.s. and a relative permittivity of 3.5. Calculate (a) the core and inner sheath radii for the most economical cable, (b) the capacitance per metre length, and (c) the charging current per kilometre run.
7. A concentric cable has a core diameter of 25mm and an inside sheath diameter of 80mm. The relative permittivity of the dielectric is 2.5, the loss angle is 3.5×10^{-3} rad and the working voltage is 132kV at 50Hz frequency. Determine for a 1 km length of the cable (a) the capacitance, (b) the charging current and (c) the power loss.

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