



COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

**TRADE DIPLOMA IN ELECTRICAL ENGINEERING (ELECTRICAL &
RENEWABLE) - STAGE 5**

EEE572 ELECTRICAL POWER GENERATION

FINAL EXAMINATION – TRIMESTER 2, 2019

Duration: 3 hours and 10 minutes

Total Marks: 100

DATE/DAY: TBA

TIME: TBA

ROOM: AS PER TIMETABLE

INSTRUCTIONS TO STUDENTS

1. You are allowed 10 minutes extra reading time during which you are NOT to write.
2. Begin each SECTION on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each attached sheet.
4. Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with a string.
5. For all sheets of paper on which rough/draft work has been done, cross it through and ATTACH these to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. Use of programmable calculator(s) is prohibited.
8. ANSWER ALL QUESTIONS
9. Show all working where necessary.
10. ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE EXAM ROOM

SECTION A**MULTIPLE CHOICE****(15 MARKS)**

1. When a power plant is not able to meet demand of consumers it will resort to
 - a) Penalizing high load consumers by increasing the charges for electricity
 - b) Power factor improvement at the generators
 - c) Efficient power operation
 - d) Load shedding

2. Load curve helps in deciding
 - a) Sizes of the generation units
 - b) Total installed capacity of the plant
 - c) Operating schedule of generating units
 - d) All of the above

3. Cost of operation of which plant is least?
 - a) Gas turbine plant
 - b) Thermal power plant
 - c) Nuclear power plant
 - d) Hydro-electric plant

4. In a hydro-electric plant a conduct system for taking water from the intake works to the turbine is known as
 - a) Dam
 - b) Reservoir
 - c) Penstock
 - d) Surge tank

5. A pelton wheel is
 - a) Inward flow impulse turbine
 - b) Outward flow impulse turbine
 - c) Inward flow reaction turbine
 - d) Axial flow impulse turbine

6. Which device automatically interrupts the supply in the event of surges
 - a) Earthing switch
 - b) Series reactor
 - c) Isolator
 - d) Circuit breaker

7. In a thermal power plant cooling towers are used to
 - a) Condense low pressure system
 - b) Cool condensed steam
 - c) Cool water used in condenser for condensing steam
 - d) Cool feed water of boiler

8. A load curve is a plot of
 - a) Load versus generation capacity
 - b) Load versus current
 - c) Load versus time
 - d) Load versus cost of power

9. The load of a consumer is generally measured in terms of
 - a) Volts
 - b) Amperes
 - c) Ampere hour
 - d) kW

10. Load factor during a period is
 - a) Average load / installed capacity
 - b) Average load / maximum load
 - c) Maximum load / average load
 - d) Maximum load / installed capacity

11. Demand factor is the
 - a) Maximum demand / average demand
 - b) Maximum demand / connected load
 - c) Average demand / maximum demand
 - d) Connected load / maximum demand

12. Connected load is
 - a) The rating in kW of the installed electrical load of the consumer
 - b) The maximum load that a consumer puts on at any time
 - c) Part of the load which always remains on at the consumer ends
 - d) Average load of the consumer during a specified period

13. Which of the following equipment is not installed in a substation?
- a) Shunt reactors
 - b) Exciters
 - c) Voltage transformers
 - d) Series capacitors
14. In outdoor substation, the lightening arrestors is placed nearer to
- a) The isolator
 - b) The current transformer
 - c) The power transformer
 - d) The circuit breaker
15. In a diesel engine the governor controls
- a) Fuel pressure
 - b) Fuel flow rate
 - c) Fuel temperature
 - d) Fuel volume

SECTION B**(40 MARKS)**

1. Explain two points that needs to be considered while making site selection of a substation.
(2 marks)
2. A number of routine tests have to be conducted on voltage transformers before they can meet the standards. State any 4 routine tests that are being carried out on VT's.
(4 marks)
3. State 4 types of transformer faults that can be indicated by the alarm of the buchholz relay.
(4 marks)
4. Draw the basic arrangement of buchholz relay and explain its operation.
(8 marks)
5. Explain the function of the governing system of a diesel power plant.
(2 marks)
6. At what speed would the governor of a 12 pole diesel-driven alternator have to be set to enable a frequency of 60 Hz to be generated?
(2 marks)
7. A 11kV/33kV power transformer is connected in delta-star. The C.Ts on the low voltage side has a turns of 450/5. Find the suitable turn's ratio for the C.Ts on high voltage side.
(5 marks)
8. State the 4 conditions that must be met for synchronizing alternators.
(4 marks)
9. State 4 applications of auto-transformer.
(4 marks)
10. Discuss the Earthing method utilized for a Transformer in a Substation.
(2 marks)
11. Explain two cooling methods of dry type transformers.
(3 marks)

SECTION C**(45 MARKS)**

1. Draw a fully labeled general layout of a diesel power plant.
(5 marks)
2. State 5 advantages and disadvantages of a diesel power plant respectively.
(5 marks)
3. Draw the block diagram of the components of the hydroelectric power plant and explain the function of dam, forebay, spillway, penstock and surge tank.
(10 marks)
4. Discuss the 4 alternator synchronizing procedures.
(4 marks)
5. A hydroelectric plant is supplied from a catchment area of 650 km^2 with an annual rainfall of 1800mm and head of 350m. Consider the yield factor of 50% and load factor of 60%. Calculate the power produced and the capacity of the power plant if the power plant has an efficiency of 90%.
(6marks)
6. List down 6 factors that are considered in the selection of a particular type of power generation plant.
(3 marks)
7. A 3MVA, 6-pole alternator runs at 1000 r.p.m in parallel with other machines on 3.3 kV bus-bars. The synchronous reactance is 20%. Calculate the synchronizing power per one mechanical degree of displacement and the corresponding synchronizing torque.
(7marks)
8. Compare between the indoor and outdoor substation on the following keynotes;
 - fault location,
 - time required for erection,
 - future expansion,
 - construction work required to be done,
 - Capital cost and cost of switchgear installation.**(5 marks)**

.....The End...