



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, 2016

Duration: 2 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

(50 MARKS)

1. Explain star-star and delta-star configurations of a three phase transformer. **(5 marks)**
2. List down 6 factors that are considered in the selection of a particular type of power generation plant. **(3 marks)**
3. Define the following:
 - Load factor
 - Utilization factor
 - Plant capacitor factor
 - Demand factor
 - Diversity factor

(Carries 1 mark each) (5 marks)
4. Name the 4 major components and the functions of a diesel power plant. **(4 marks)**
5. The generating station on a particular day has a maximum demand of 40MW, a load factor of 70%, a capacity factor of 47% and a utilization factor of 83%. Calculate the daily average energy produced and the reserve capacity of the plant. **(5 marks)**
6. Explain the basic principle of wind power generation. **(3 marks)**
7. Discuss the 4 requirements of synchronizing an alternator to the grid. **(4 marks)**
8. A hydroelectric plant is supplied from a catchment area of 400 km² with an annual rainfall of 1600mm and head of 250m. Consider the yield factor of 50% and load factor of 70%. Calculate the power produced and the capacity of the power plant if the power plant has an efficiency of 80%. **(6marks)**
9. A 5MVA, 50 Hz, 3-phase star connected synchronous generator having a synchronous reactance of 20 % is running at 1500rpm and is excited to give 11000 V. Calculate the synchronizing power per one mechanical degree of displacement and the corresponding synchronizing torque. **(7marks)**
10. Tabulate the major hourly, daily/ weekly/monthly maintenance schedules for a Diesel Generator. **(8 marks)**

SECTION B**(55 MARKS)**

1. Illustrate the schematic arrangement of a steam power plant. **(3 marks)**
2. State two advantages and disadvantages of interconnected system. **(2 marks)**
3. A 11kV/33kV power transformer is connected in delta-star. The C.Ts on the low voltage side has a turns of 500/5. Find the suitable turn's ratio for the C.Ts on high voltage side. **(4 marks)**
4. Draw a fully labeled schematic arrangement of a hydroelectric power plant and explain the meaning of dam, fore-bay, spillway and penstock in regards to hydro power plant. **(6 marks)**
5. Generators are casually disturbed by high/low intensity electrical and mechanical faults. State 3 common electrical faults that hinder a generator's performance and what protection devices are connected to overcome each of the three faults mentioned. **(3 marks)**
6. State 3 advantages and disadvantages of auto-transformer. **(3 marks)**
7. Discuss Earthing methods utilized for a Generator/Transformer in a Substation. **(3 marks)**
8. State the conditions that must be followed for satisfactory parallel operation of transformers. **(4 marks)**
9. Explain two cooling methods of oil immersed transformers. **(3 marks)**
10. A 240V single phase energy meter has a constant load of 10A passing through it for 4.9 hours at 0.85 pf. If the meter disc makes 1000 revolutions during this period, find the meter constant in revolutions per kWh. If the power factor of the load is unity, what number of revolutions would the disc make in the above time? **(5 marks)**
11. Identify any four components of a substation. **(2 marks)**
12. What is a "Heat run" test? **(2 marks)**
13. Explain hunting of alternators. **(2 marks)**
14. Describe the procedural steps for putting incoming alternator in parallel with a running machine. **(8 marks)**

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