FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

END OF FIRST SEMESTER EXAMINATION, 2019 /2020

PROGRAMME & YEAR	:	HND EEE 3
COURSE CODE & TITLE	:	EEE 328: ELECTRICAL EQUIP. MAINTENANCE
EXAMINER	:	IDDRISU DANLARD
TIME ALLOWED	:	3 HOURS
INSTRUCTIONS	:	*Answer **all** questions*

1. (a) *Preventive maintenance* and *predictive maintenance* are commonly adopted maintenance strategies. Briefly explain the above-mentioned maintenance strategies and outline three (3) distinct merits for each. Support your answers with two (2) examples each. (10 marks)

(b) An induction motor is coupled to a compressor via a helical gearbox with considerable load variation. The setup has a number of vibration-inducing equipment all around the compressor. Moreover, the compressor is located near a heat treatment furnace. With these conditions, suggest a technique that will effectively monitor the motor's operations. Explain your answer in detail. (4 marks)

(c) A system is composed of five replaceable subsystems 1-5, with failure rates (λ) as follows: $\lambda_1 = 0.002$ failures/hour, $\lambda_2 = 0.003$ failures/hour, $\lambda_3 = 0.004$ failures/hour, $\lambda_4 = 0.005$ failures/hour, and $\lambda_5 = 0.006$ failures/hour. The corresponding corrective maintenance times for subsystems 1-5 are $T_1 = 1$ hour, $T_2 = 2$ hours, and $T_3 = 3$ hours, $T_4 = 4$ hours, $T_5 = 5$ hours respectively. Calculate the MTTR of the equipment. (6 marks)

2. (a) There are many benefits in implementing a computerized maintenance management system (CMMS) in an organization. Explain the role of a CMMS in effective maintenance scheduling. Illustrate your answer with at least three (3) examples. (6 marks)

(b) A centrifugal pump was operated for 9 hours per day for a year. The MTBF and MTTR of the pump were recorded as 168 hours and 2 hours respectively. Compute its availability and determine the overall operational hours within the period. (4 marks)

(c) Your company has recently experienced significant maintenance problems with several equipment. Your supervisor has asked you to review the preventive maintenance program and identify any weaknesses. Detail the criteria you will use to evaluate the program. (10 marks)

3. (a) When you have to inspect, clean, test and maintain low-voltage transformers it is important to have a work plan. Produce a work plan for when you have to inspect, test and maintain a low-voltage transformer. Your plan must include all the tools that you will need to complete the task successfully, a step-by-step explanation of the work that you will do, and necessary isolation of circuitry. (10 marks)

(b) A motor was operated for 1220 hours/year. The MTBF and MTTR of the motor were 390 hours and 29 hours respectively. Determine the annual labor cost of corrective maintenance if the maintenance labor cost was GH¢ 39 per hour.

(4 marks)

(c) A large manufacturing company installed some asset monitoring devices on some large motors that were deemed critical equipment. The monitoring devices provide engineering with vibration data, acoustic data, as well as operational performance data. Determine the asset management strategy selected for the motors. Explain your answer in detail.

(6 marks)