CLASS: BE   SEMESTER : VII
BRANCH: BIOTECH/PROD/CIVIL   SESSION : MO/18

SUBJECT: PE7021 MAINTENANCE ENGINEERING
TIME: 3:00 HRS.   FULL MARKS: 60

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)   What is Maintainability? Explain the maintainability product life cycle.   [2]
Q.1(b)   Describe Ishikawa Diagram, also explain the Brainstorming.   [4]
Q.1(c)   Define the terms "Total Quality Maintenance" and explain the Continuous Process Improvement,   [6]
         Total Employment Involvement and zero defect.

Q.2(a)   Define the terms (i). MTBF (ii). MTTF (iii). Mean life (iv) MTTR   [2]
Q.2(b)   Calculate the reliability of the system   [4]
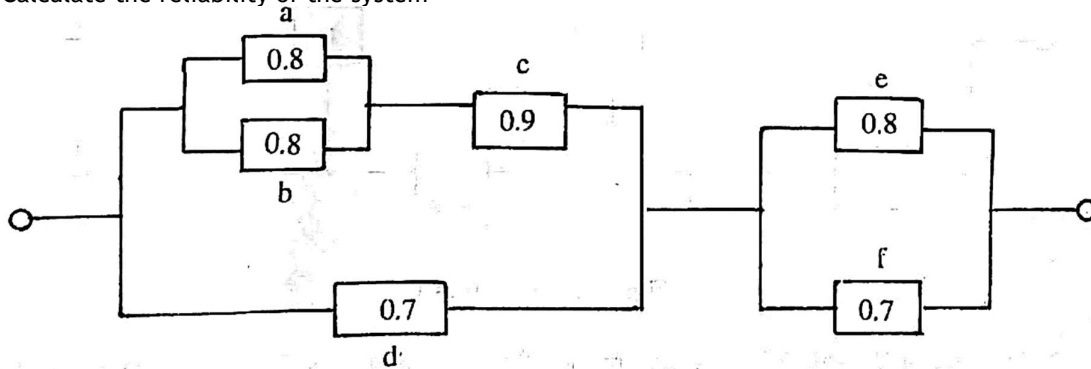
Q.2(c)   It is desired to have a reliability of at least 0.990 for a specified service period of 8,000 hours on   [6]
         the assumption of a uniform failure rate. What is the least value of θ that will yield this desired
         reliability?

Q.3(a)   Differentiate between the preventive action and corrective action.   [2]
Q.3(b)   Define the terms "Reliability based maintenance" and explain Reliability Centered Maintenance   [4]
         procedure.
Q.3(c)   Define Protective maintenance and explain preventive maintenance and predictive maintenance.   [6]

Q.4(a)   What is Terotechnology concept? Explain its objective.   [2]
Q.4(b)   Describe Condition Monitoring. Explain different levels of monitoring.   [4]
Q.4(c)   What Strategies used in Terotechnology and write different types of phase used in Terotechnology. [6]

Q.5(a)   Define the static and dynamic test approach in maintainability testing.   [2]
Q.5(b)   Explain the following maintenance cost: (i) Direct costs (ii) Lost Production cost (iii) Degradation   [4]
         costs (iv) Standby costs
Q.5(c)   Define the term "Corrective Maintenance Labor Cost Estimation". Assume that in a maintenance   [6]
         organization, the total number of annual hours is 2000 h, with benefit ratio 0.2. Total 40 number
         of employee given ₹15 per hour. Calculate the total labor cost associated with the maintenance
         activity.

Q.6(a)   Write the Causes of Electrical Hazard.   [2]
Q.6(b)   Explain the different types of damage in mechanical hazard.   [4]
Q.6(c)   What is the fire hazard? Write the sources of fire hazard and explain the types of fire.   [6]

Q.7(a)   What is Hazard Identification and Risk Assessment?   [2]
Q.7(b)   Explain the risk matrix with an example.   [4]
Q.7(c)   Describe briefly the following techniques of hazard identification   [6]
        (i) Plant safety inspection
        (ii) Job Safety analysis
        (iii) Accident/ Incidence Investigation
        (iv) Safety Audit