

6. What are the principles of condition based maintenance ? Enlist the factors that promote the use of condition based maintenance. 15

#### Unit IV

7. Give the concept of Total Product Maintenance (TPM). Explain the role of maintenance engineer in implementing TPM. 15
8. Discuss in detail systematically the various steps involved in the liquid penetrate testing method and analysis. 15

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**M. Tech. EXAMINATION, May 2018**

(Second Semester)

(B. Scheme) (Main & Re-appear)

(ME)

MEI520B

RELIABILITY AND MAINTENANCE  
ENGINEERING

*Time : 3 Hours]*

*[Maximum Marks : 75*

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Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

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**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Use of Statistical

Tables is permitted. Assume the missing data, if any, suitably.

### Unit I

1. Differentiate between Failure Rate and Hazard rate and establish relationship between them ? Also express the reliability as a function of the hazard rate. **15**
2. Three independent and identical machines form a parallel system. Each machine's time to failure are exponentially distributed with a mean time to failure of 150 h. The periodic Preventive Maintenance (PM) is performed after every 75 h. Determine the system mean time to failure with a without the performance of periodic PM. **15**

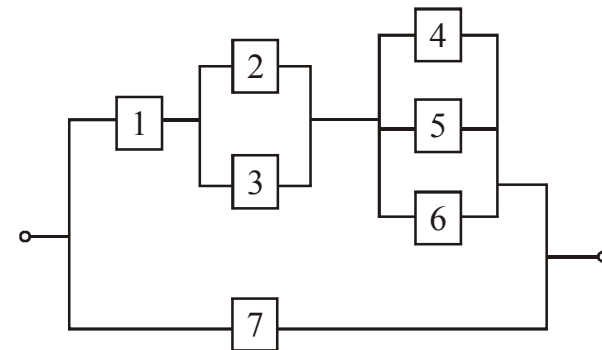
### Unit II

3. What are the elements of Failure Mode and Effect Analysis (FMEA) ? Give its advantages and limitations. **15**

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4. Derive a general expression for the unreliability of the system whose reliability model is shown in Figure. Consider the case in which all parallel branches of this system are fully redundant with the exception of that consisting of components 4, 5 and 6 for which any *two* of the branches are required for system success. **15**



### Unit III

5. What are the types of maintenance schedule that are prevalent in industries and explain the benefits of proper scheduling ? **15**

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