BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: PRE-PHD **SEMESTER : NA**
BRANCH: PROD **SESSION : SP/17**

SUBJECT: MPE2009 MAINTENANCE TECHNOLOGY

TIME: 03:00 **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.
6. Nothing should be written on front or back of the question paper except tick marking.

Q1.	(a)	How can you classify fault and failure of an equipment? Classify 'failure' of an equipment.	[2]
	(b)	Define maintainability. What are the various factors affecting maintainability?	[4]
	(c)	Enlist the statistical distributions used in failure analysis. Explain the significance of various parameters of 'Weibull Distribution' in failure analysis.	[6]
Q2.	(a)	Define reliability. Express 'reliability' mathematically.	[2]
	(b)	How reliability, maintainability and availability of an equipment are interrelated?	[4]
	(c)	Explain various forms of equipment availability.	[6]
Q3.	(a)	Explain reliability block diagram (RBD) with an example.	[2]
	(b)	Distinguish between series and parallel system reliability models.	[4]
	(c)	A system consists of 3 units whose reliability block diagram is in series. The failure rate of each unit is constant as follows: $\lambda_1 = 4.0\times10^{-6}\,h^{-1}$, $\lambda_2 = 3.2\times10^{-6}\,h^{-1}$, $\lambda_3 = 9.8\times10^{-6}\,h^{-1}$. Determine the following parameters of the system: (i) λ_s, (ii) R_s (1000h), (iii) $MTTF_s$. If the system is composed of same units in parallel, what will be the system reliability?	[6]
Q4.	(a)	What are the limitations of breakdown maintenance?	[2]
	(b)	Distinguish between preventive and predictive maintenance.	[4]
	(c)	Briefly explain the steps of corrective maintenance. State its advantages and disadvantages.	[6]
Q5.	(a)	Why condition monitoring is required for various equipment?	[2]
	(b)	Classify condition monitoring techniques.	[4]
	(c)	Briefly explain various 'vibration monitoring' and 'lubricant analysis' techniques.	[6]
Q6.	(a)	What are the essential features of computerized maintenance management system (CMMS)	[2]
	(b)	State the procedural steps in implementing reliability centered maintenance(RCM).	[4]
	(c)	Explain the pillars of Total Productive Maintenance (TPM).	[6]
Q7.	(a)	What is meant by 'design-out maintenance'?	[2]
	(b)	State the benefits of terotechnology.	[4]
	(c)	Explain the phases in terotechnology.	[6]

*******28/04/17******E**