ITMMEC – IIT DELHI

Major Test – ITL709 (Maintenance Planning & Control)

Date: 22nd November 2008 (Saturday) Max. Marks: 40

Time: 2 Hours

Note: 1. Attempt all questions

2. Missing data, if any, may be suitably be assumed

Q I. a) Consider a continuous plant that is represented by a line diagram, Fig. 1. It consists of: Supply hopper, Belts (1 to 3), Elevator belt and the mixer. The plant works round the year i.e. 168 Hrs. / week and 52 weeks /year. The plant deals with sand material transportation & mixing, then transferring to an other line for further use. The sand material is fed to the supply hopper and goes out of the mixer.

IN →SUPPLY→ BELT 1→BELT 2 →ELEVATOR →BELT 3 →MIXER →OUT
HOPPER BELT

Fig. 1 Line diagram of the continuous plant supplying sand material

The maintenance requirement for each item of the plant is as below.

SUPPLY HOPPER: Lining requires repair (welding) at approx. 6 M. Wear is detectable but requires stoppage of work for inspection. Repair requires 4 Hrs. of stop work.

BELT (1 to 3) : Have a life of 4 + 1 week. Deterioration is detectable whilst running. Replacement requires 8 Hrs. of stop work.

ELEVATOR BELT: Has a life of 8+1 week. Deterioration is detectable under running conditions. Replacement requires 3 Hrs. stop work.

MIXER: Blades have a life of 8+1 week. Deterioration is detectable whilst it is running. Replacement requires 8 Hrs. of stop work.

Answer the following:

(i) List out **a critical item** of the plant and suggest **its** maintenance plan.
(ii) Suggest also the maintenance shutdown of the line.
(iii) Propose ways to improve the availability of the plant.

b) A large company operates a continuous plant i.e. 24 hrs. /day; 7 days / week; 52 weeks / year to manufacture industrial chemicals. Every two years there is a planned 3-week shutdown period for major maintenance work. Planned availability of the plant is 93%.Table 1 shows the downtime for just concluded two-year period.

(i) Compare the level of downtime (i.e. hours / week) for a just concluded two-year period with the planned or targeted level, with the shutdown period excluded.
(ii) Comment on the significant contributing factors causing downtime (Table1) and measures to minimize it.

(11, 7= 18)

Q II. a) What is human error in the context of maintenance? List typical errors that usually occur in the plants and also suggest measures to minimize these.

b) What is the main weakness of traditional administrative structure in plants from maintenance point of view? How can this be overcome?

c) Which modules will be desirable when ordering a maintenance software for plant application and why? List also the current developments in this.

(4 x 3 = 12)

QIII. a) Tabulate; features and limitations of maintenance strategies: Breakdown, Preventive and Condition based maintenance.

b) List any instances which can lead to serious accidents due to maintenance work in chemical and process industries. Suggest how these can be avoided.

c) Describe in brief utility of Du Pont procedure for performance assessment of a maintenance Department.

(3, 4, 3 = 10)

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