Minor Test I –Maintenance Planning & Control (ITL709)

Date: 1-9-2015 (Thursday) **Max. Marks: 30**

Time: 1 Hour

Note : 1. Missing data, if any, may suitably be assumed.

Q I. a) **Answer the following in brief and to the point:**

i) List two maintenance tasks that require safety permit, and why?

ii) What is reconditioning of a component?

iii) For which plant equipment, 'Operate to Failure' maintenance strategy is unsuitable.

iv) How can the life cycle profit of a plant be enhanced?

b) A production plant has 120 high-speed rolling bearings. Their time-to-failure failure varies randomly, with mean of 5 years. Unexpected failure causes production loss.

Use the following data to find out the best maintenance option; 1. CBM or 2. PM, to maintain the rolling bearings based on the cost.

CBM.

Cost of a bearing: Rs. 2000/-
Labour cost for a replacement after failure: Rs. 1000/-
Labour cost for a planned replacement: Rs. 500/-
Downtime production loss for an unplanned replacement: Rs. 10,000/-
Downtime cost for a planned replacement: Rs. 5000/-
Condition monitoring cost for one time use, including overhead of a skilled technician: 5000/-

1. CBM (Condition Based Maintenance); Monthly trend monitoring of shock pulse measurement (SPM) of the bearings, which is carried out by a skilled technician in a shift of 8 hours. Assume no unscheduled bearing failure.

2. PM (Preventive maintenance); Scheduled replacement of 2 bearings per month. Assume one unscheduled bearing failure a month.

(4, 2, 2, 3, 5 = 16)

Q II. Refer Figures 1 (a) and (b) for rotary joint of a heated cylinder assembly of a paper machine. Steam heated cylinders (22 Nos.) form the dryer of the paper machine. Steam enters each joint via a flexible hose and passes through the joint on the outside of a syphon pipe. The steam condenses in the cylinder and returns to the joint via the syphon. The condensate leaves the joint through condensate head, a flexible hose pipe carrying it to the sink. The rotary part of the joint is made up of quick release mechanism, shank, spherical washer and gland assembly. During operation, seal A and seal B wear but it has been found that seal A fails first, allowing steam to escape, damaging the paper and therefore, precipitating machine shutdown. The spring provides the sealing force between the shank/ seal B, and washer / seal A interfaces and also promotes self adjustment of joint as the seals wear. The seals have a life of anything between 6 and 30 months. Steam leaks often require the machine to be taken off-line. Replacement of the joint after failure or for seals A and B detailed inspection takes 4 hours of off-line work of fitter. Inspection is performed weekly for 22 joints that takes 1 hour of the fitter, which helps to identify a rotary joint that will be replaced at the next monthly stoppage of the paper machine.

One month

6-30 mont

Answer the following for the rotary joint:

i) Estimate the annual maintenance workload for the fitter, if in a month on an average; one joint fails suddenly. Assume that the plant has 16 paper machines that are operating at one location.

ii) Initiate a MWO (Maintenance Work Order) for its maintenance.

iii) Prepare 'Job Specification' of a maintenance task / activity of the MWO raised above, i.e. in Part ii).

(5, 4, 5= 14)

---------- **Refer Figures 1 (a) and (b) in the attached sheet** ----------

One month.

Job description
(1) scheduling Resources.
(2)

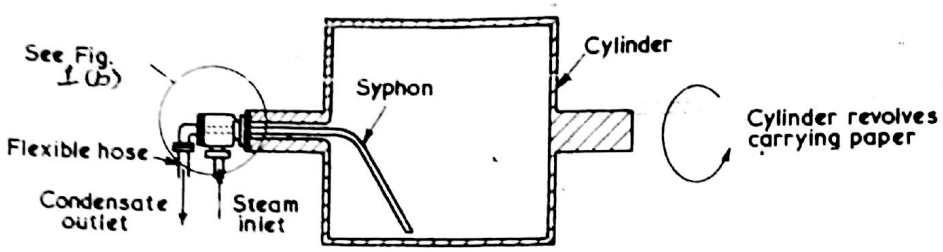

Figure 1 (a) Rotary joint of heated cylinder assembly

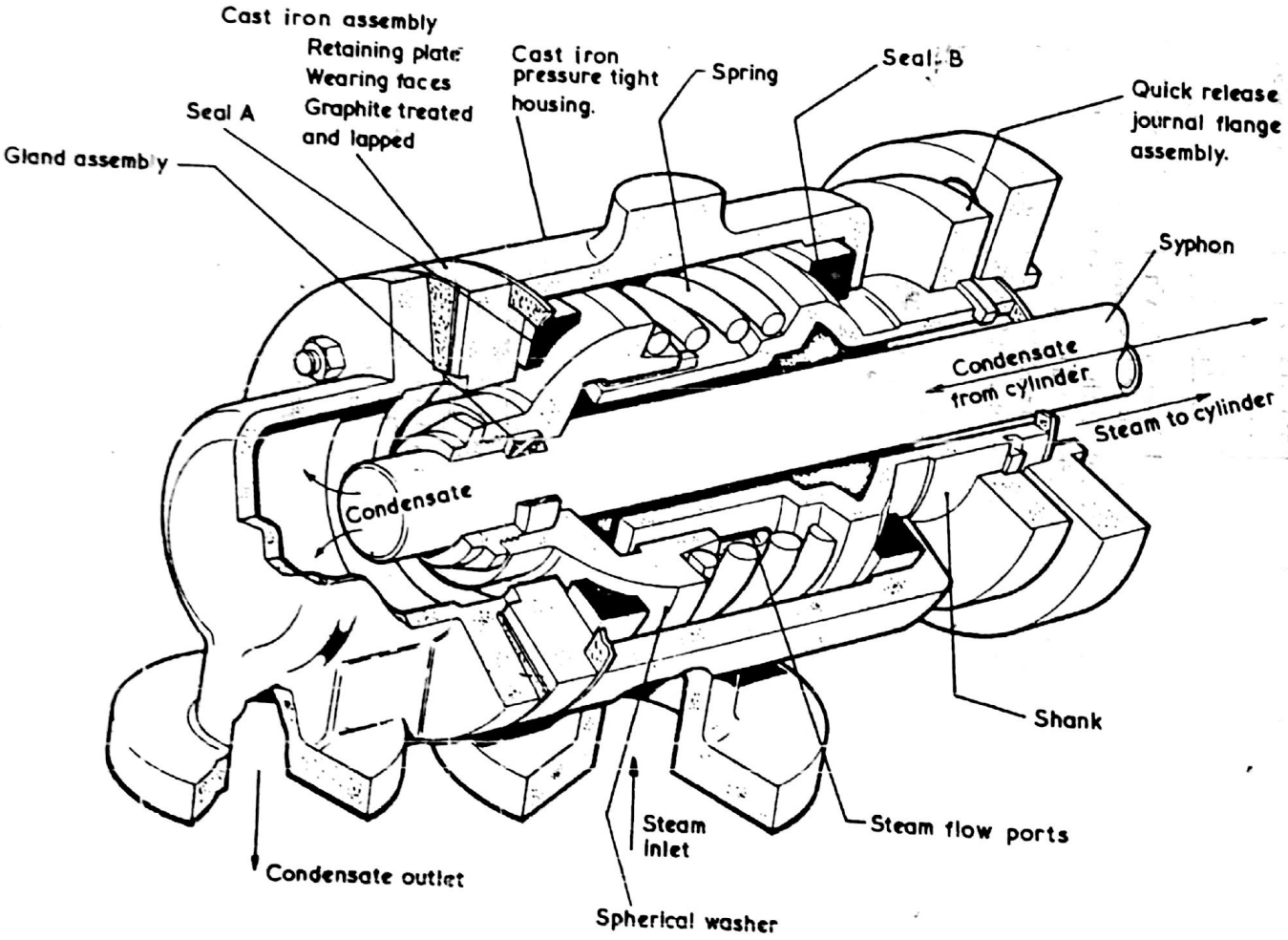

Figure 1 (b) Cutaway diagram of rotary joint