

**GME - Maintenance Technology**

**T061**

**Friday, 01/11/2013**

**8:30 - 11:30 AM**

**WORKFORCE DEVELOPMENT AUTHORITY**



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**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2013,  
TECHNICAL AND PROFESSIONAL TRADES**

**EXAM TITLE: Maintenance Technology**

**OPTION: General Mechanics (GME)**

**DURATION: 3 hours**

**INSTRUCTIONS:**

The paper contains **Three (3)** Sections:

**Section I:** Fourteen (14) questions, all **Compulsory**. **55marks**

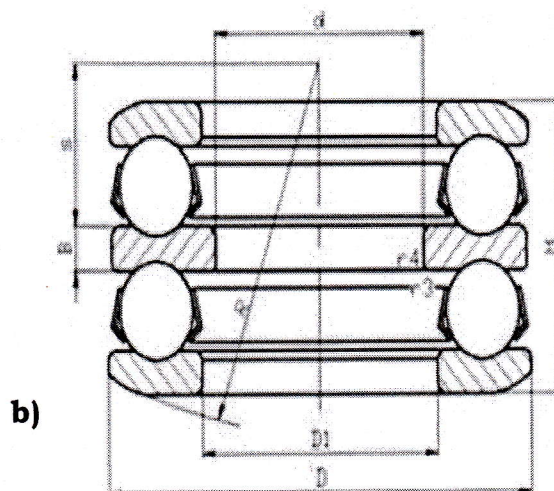
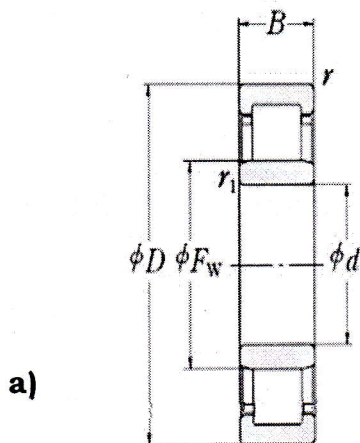
**Section II:** Five (5) questions, **Choose any Three (3)**. **30marks**

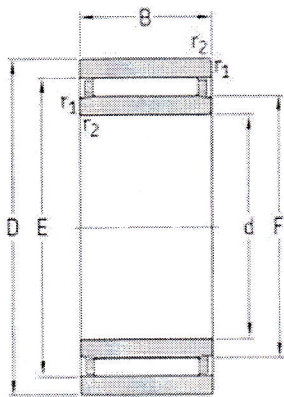
**Section III:** Two (2) questions, **Choose any ONE (1)**. **15marks**

**Section I: All questions are compulsory**

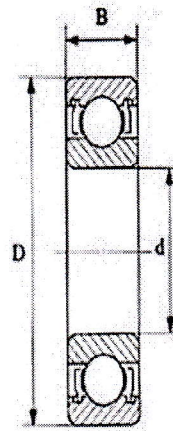
**55marks**

- 01. Give the main characteristics of a thread form. **5marks**
- 02. When is a Torque wrench used? **2marks**
- 03. Define the terms used in threads: **5marks**
  - a. Pitch
  - b. Crest
  - c. Internal thread
  - d. Angle of thread
  - e. Lead
- 04. How can you identify: **4marks**
  - a. Right – hand thread
  - b. Left – hand thread
- 05. What are the units of pitch in threads? **2marks**
- 06. Give the purposes of the screw drives. **4mark**
- 07. If a hydraulic motor does not provide the proper speed and torque what should be the possible causes for it? **4marks**
- 08. What is the fundamental difference between hydraulics and pneumatics? **2marks**
- 09. Differentiate the Open belt drive from the Cross belt drive. **2marks**
- 10. Give the different types of grease lubricators. **3marks**
- 11. Differentiate the Whitworth Screw thread from the International Standard Metric thread. **6marks**
- 12. You want to determine the characteristics of a damaged pinion. When counting, you find the number of teeth of 23. When measuring, you find the addendum diameter around 124.5 mm. Calculate: Module, Pitch diameter, and the correct addendum diameter. **3marks**
- 13. List the directions and nature of loads in bearings. **5marks**
- 14. Name the following bearings: **5marks**

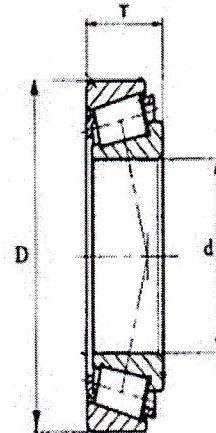




c)



d)



e)

15. Why is water not commonly used as a hydraulic fluid?

3marks

**Section II. Choose and answer any three questions**

**30marks**

16. a. Explain the phenomenon of “cavitation” in centrifugal pump.

b. Give the methods of coupling motor to centrifugal pump and the challenges during the assembly.

c. Classify reciprocating pumps according to:

i. the action of water;

ii. the number of cylinders.

10marks

17. List the 5 types of gear drives used in mechanical systems and say the relative position of shaft axes for each type of gearing.

10marks

18. a. What are the advantages of pneumatic system?

b. List any four common types of pump faults.

10marks

19. A lifting system shown in figure below consists of a gearing of gear ratio of 1/3.

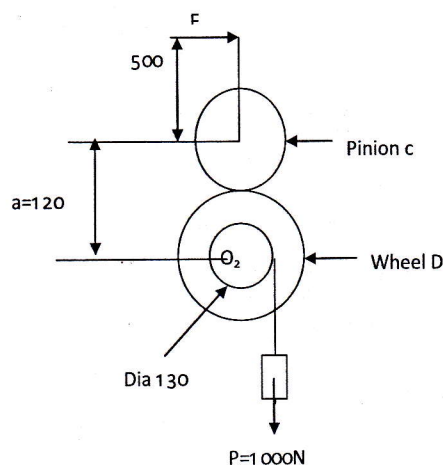
a) If the distance between axes  $a = 120$  mm, determine the pitch diameters of pinion C and wheel D.

b) If the module of gears is 3 mm, calculate the number of teeth for pinion C and wheel D.

c) Calculate the addendum diameters for pinion and wheel.

d) Find the magnitude of force F holding the system in equilibrium.

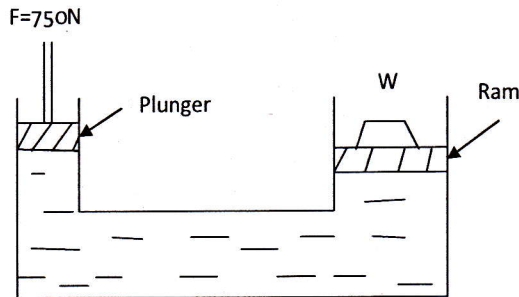
e) Determine the displacement of the load P for 1 revolution of the crank. 10marks



20. a. What is the purpose of seals?

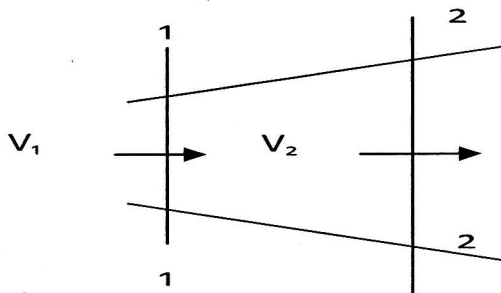
b. Give and define the two main groups of seals.

c. The diameters of ram and plunger of a hydraulic press are 50 mm and 25 mm respectively. Find the weight lifted by the press when the force applied at the plunger is 750 N.



d. The diameters of a pipe at the sections 1 - 1 and 2 - 2 are 100 mm and 150 mm respectively. If the velocity of oil flowing through the pipe at section 1 - 1 is 3.5m/s, find:

- i. Discharge through the pipe      ii. Velocity of oil at section 2 - 2.



10marks

**Section III: Choose and answer any one question. 15marks**

21. Fill in the table for belt drive maintenance:

15marks

Symptoms	Probable causes	Corrective actions
Broken belt		
Wear on top surface of belt		
Belt squeals		

22. Give the advantages and disadvantages of lubrication of rolling bearings by:

a. Grease

b. Oil

15marks