



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**PEPERIKSAAN AKHIR  
SEMESTER II  
SESI 2010/2011**

NAMA KURSUS : PENGURUSAN DAN PENJIMATAN  
TENAGA

KOD KURSUS : BDE 4023

PROGRAM : SARJANA MUDA KEJURUTERAAN  
MEKANIKAL DENGAN KEPUJIAN

TARIKH PEPERIKSAAN: APRIL / MEI 2011

JANGKA MASA : 2 JAM

ARAHAN : JAWAB **EMPAT (4)** SOALAN SAHAJA  
DARI LIMA (5) SOALAN YANG  
DISEDIAKAN.

KERTAS SOALAN INI MENGANDUNGI EMPAT (4) MUKA SURAT

- Q1** (a) Energy principles
- (i) What is Energy ?
  - (ii) What are the importance of Energy to Mankind ?
  - (iii) Please state the Energy Equation by Einstein's.
- (9 marks)
- (b) Energy plays a key role in the development and growth economy. Therefore, the availability of adequate supplies of energy is an issue for any country including Malaysia. What are the roles of the plant engineer in energy management to ensure its success?
- (6 marks)
- (c) More than 95% of energy in Malaysia comes from fossil fuel (MAESCO & PTM, 2003) . Taking into account the high rate of energy demand in Malaysia (increasing more than 8 % annually), there is a need to evaluate several impacts. Please explain these impacts:
- (i) Weather impact;
  - (ii) Volume / Mix impact; and
  - (iii) Pollution Control impact.
- (10 marks)
- Q2** (a) What is an Industrial Energy Assessment?
- (4 marks)
- (b) Briefly explain these assessment types
- (i) Walk-through;
  - (ii) Mini-assessment; and
  - (iii) Detailed-assessment.
- (9 marks)
- (c) The energy utilization program usually contains the following steps. Briefly explain:
- (i) Determine energy uses and losses.
  - (ii) Implement actions for energy conservation.
  - (iii) Continue to monitor conservation efforts.
- (12 marks)

- Q3** (a) Investment decision making is very important before involving with the energy economic. Explain:
- (i) Single Payment Compound Amount- F/P ; and
  - (ii) Single Payment Presents Worth- P/F.
- (10 marks)
- (b) An evaluation of needs to be made to replace all 40-watt fluorescent lamp with a new lamp that saves 12% or 4.8 watts and gives the same output. The cost of each lamp RM 4.80. Assuming a rate of return before taxes of 25% are required, can the immediate replacement be justified? Hours of operation are 4800 and the lamp life is two years. Electricity cost is 70 cent/ kWh.
- (10 marks)
- (c) What are the load factor of a continuously operating facility the consumed 980,000 kWh of energy during a 30 day billing period and established a peak demand of 220 kW?
- (5 marks)
- Q4** (a) The total bill for the month is RM 450,000 and the power factor (PF) is 0.8.
- (i) Calculate the monthly penalty, which TNB charges you the low PF.
  - (ii) How much would be monthly PF penalty if PF was 0.7 instead of 0.8.
- (10 marks)
- (b) The torque developed on the shaft of a 10 kW electric motor at a speed of 1450 r.p.m is 25.5 Nm. Calculate the motor shaft power (kW), loading factor and the efficiency of the motor at this loading condition if a kilowatt meter shows that the motor demand is 5.16 kW.
- (15 marks)

- Q5** The compressed air system supplied with screw compressor driven by a 160 kW electric motor. The maximum Rated Free Air Delivery is 350 l/s. The compressor runs for 6,000 hours/year. Calculate the annual cost of air leaks. The following data have been collected for a typical load cycle of the compressor:

The current for the 3 phase's data:

	<b>Loaded</b>	<b>Unloaded</b>
Phase 1	243	178
Phase 2	245	176
Phase 3	247	178
<b>Average</b>	<b>245</b>	<b>177.4</b>

The times for load-unload cycle during production are:

<b>Loaded (sec)</b>	<b>Unloaded (sec)</b>	<b>Total Cycle (sec)</b>
50	10	60
51	8	59
51	9	60
50	11	61

The times for load-unload cycles outside production hours are:

<b>Loaded (sec)</b>	<b>Unloaded (sec)</b>	<b>Total Cycle (sec)</b>
25	20	45
26	22	48
25	21	46
27	20	47

- (i) Estimate compressor load (kW);
- (ii) Calculate compressor average load (kW) during production period;
- (iii) Estimate the compressor power during the leak test;
- (iv) Estimate energy and cost due to leaks; and
- (v) Estimate cost saving from leak reduction program.

(25 marks)