POLITEKNIK
Jabatan Pengajian Politeknik

EXAMINATION AND EVALUATION DIVISION
DEPARTMENT OF POLYTECHNIC EDUCATION
(MINISTRY OF HIGHER EDUCATION)

MECHANICAL ENGINEERING DEPARTMENT

FINAL EXAMINATION

DECEMBER 2011 SESSION

J5222 : INDUSTRIAL MANAGEMENT

DATE : 03 MAY 2012 (THURSDAY)
DURATION : 2 HOURS (2.30 PM - 4.30 PM)

This paper consists of **EIGHT (8)** pages including the front page.
Structured/Essay (6 questions – answer any **4 question**)

CONFIDENTIAL
DO NOT OPEN THIS QUESTION PAPER UNTIL INSTRUCTED BY THE CHIEF INVIGILATOR

STRUCTURED (100 marks)

Instruction: This section consists of 6 structured questions. Answer 4 questions only.

QUESTION 1

a) i. List **THREE (3)** importance of industrial management.

(3 marks)

ii. State the definition of productivity.

(2 marks)

iii. State **FOUR (4)** factors that influence productivity.

(4 marks)

b) i. State the definition of method study.

(2 marks)

ii. State the basic steps in method study.

(6 marks)

iii. Construct a flow process chart for an operator to do machining of the component. The normal cycles are as follows:

- Lying in store
- To machine (4 meter)
- Loaded on machine (2 min)
- Machining of component (5 min)
- To inspection bench (12 min)
- Waited till inspector is free (15 min)
- Inspect component (2 min)
- To stores (12 meter)
- Placed in the rack (0.2 min)
- Stored in the rack

(8 marks)

QUESTION 2

a) Given the following time study data conducted by continuous time measurement. Use an allowance of 15% and unit in seconds.

Activity	Cycle of observation 1	2	3	4	5	Performance rating (PR)
Get casting	0.21	0.21	0.21	0.23	0.20	0.95
Fix into fixture	0.27	0.28	0.25	0.26	0.25	0.90
Drilling operation	1.04	1.05	1.00	1.04	1.04	1.00
Unload	0.21	1.19	0.25	0.20	0.22	0.95
Inspect	0.25	0.26	0.24	0.21	0.25	0.80
Replace	0.12	0.12	0.10	0.12	0.13	1.10

Calculate:

i. average time for each activity
ii. normal time for each activity
iii. standard time for each activity

(12 marks)

b) Three locations are listed as potential locations to relocate the branch of MZ Company. The following data is given weights for each location. By using the factor rating method, determine which location should be chosen by the company.

Critical factor	Weight	Score Ipoh	Melaka	Kelantan
Power	0.20	65	80	75
Fuel economy	0.20	85	70	75
Spaciousness	0.15	75	60	60
Look	0.15	60	70	65
Interior	0.15	70	60	50
Safety	0.15	70	65	65

(13 marks)

QUESTION 3

a) State the definition of loading

(2 marks)

b) There are **FIVE (5)** jobs which are to be processed on work centre sheet metal shop. The processing time is given below.

Jobs	A	B	C	D	E
Processing time (days)	4	17	14	9	11

Use SPT rule to:

i. Determine the sequencing of the jobs

ii. Calculate the total completion time

iii. Find the average delay

(9 marks)

c) There are seven jobs to be pressed first on machine 1 and then machine 2. Processing time in hours is given below.

Job	A	B	C	D	E	F	G
Machine 1	6	24	30	12	20	22	18
Machine 2	16	20	20	13	24	2	6

Find the optimal sequence graphically and compute idle time on machine 2 using Johnson`s rule.

(14 marks)

QUESTION 4

a) A project must be done based on the activities given in table below:

Tasks	Code	Time (hour)	Tasks before
1-2	A	7	-
2-3	B	10	A
2-4	C	12	A
3-6	D	8	B
4-5	E	8	C
4-7	F	5	C
5-6	G	8	E
5-8	H	8	E
6-9	I	15	DG
7-9	J	10	F
8-9	K	6	H
9-10	L	10	IJK

i. Sketch the link diagram for this project by using the Critical Path Method. State the beginning, ending and slack time for each node.

(15 marks)

ii. Determine the time to complete the project and name the critical path activities.

(4 marks)

iii. If activity G(5-6) is facing a 3 hours delay, what will happen to the overall time taken to complete the project?

(6 marks)

QUESTION 5

a) List **THREE (3)** types of common problems that can be easily solved by using the Linear Programming in operational management task.

(6 marks)

b) Solve the following linear programming problem graphically:

Maximize profit = Z = 7R + 5S

Subject to:

$4R + 3S \leq 240$

$2R + S \leq 100$

$R,S \geq 0$

(19 marks)

QUESTION 6

a) What is the difference between predictive maintenance and breakdown maintenance?

(5 marks)

b) A manager of a manufacturing industry would like to do a survey on the expenditure that will be spent for the maintenance of 10 machines in the production floor. It was found that a machine normally needs RM 500 for its preventive maintenance. Whereas, incurring cost to repair each breakdown machine is RM 350. Based on the data in the table below, determine :-

Preventive maintenance taken at *n* no. of months	No. of failures occurred *at n* no of month
1	2.00
2	3.40
3	6.88
4	12.14

i. the average cost for preventive and breakdown maintenance for each period.

ii. the best period for running the maintenance in order to achieve cost effectiveness.

(14 marks)

c) Explain what is meant by the following terms:

i. JIT
ii. OSHA

(6 marks)