Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2013/2014

COURSE NAME	:	PROJECT PLANNING AND SCHEDULING
COURSE CODE	:	BPD 33903
PROGRAMME	:	3 BPC
EXAMINATION DATE	:	JUNE 2014
DURATION	:	3 HOURS
INSTRUCTION	:	A) ANSWER **ALL** QUESTIONS
		B) ANSWER **TWO (2)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **EIGHT (8)** PAGES

SECTION A

Q1 One of the methods that can be used for the purpose of project planning that has repetitive activities is that of Linear Scheduling or Line of Balance (LoB).

(a) State **SIX (6)** steps required to be taken in the use of Linear Scheduling.

(6 marks)

(b) The following information in Table **Q1** refers to a piping project of 12 000 m length.

Table **Q1**: Productivity of Piping Project Activities

Activity	Productivity (meters per day)
Land Survey and Layout	1000
Site Clearance	800
Trench Excavation	400
Pipe Laying	600
Backfill	300

(i) Sketch a Velocity Diagram using graph paper indicating clearly activities that are conflicting.

(8 marks)

(ii) Sketch a Velocity Diagram stating clearly the buffer that needs to be considered in the planning in order to avoid conflicts.

(8 marks)

(iii) Identify the project completion period for the piping project that is planned in Q (b) (ii) that does not have conflicts.

(3 marks)

Q2 Projects are categorized as time-constrained or resource-constrained. The scheduling of time-constrained projects focuses on resource use, whilst scheduling of resource-constrained focuses on prioritizing and optimizing use of limited resources in order to minimize project delay. Heuristics are used for the purpose of prioritizing the scheduling of resources.

(a) State **FIVE (5)** steps that need to be undertaken in the process of resource planning.

(5 marks)

(b) Explain the method of Splitting and Multi-tasking that is used on projects that are resource-constrained in order to schedule projects more effectively or optimize resource use.

(4 marks)

(c) You are the project manager for an Industrialized Building System (IBS) school building project (titled IBS I) in Johor Bahru, and you have prepared the project schedule involving the use of cranes as the main resource based on information in Figure **Q2**. Activity E dan F requires 2 'cranes', and activity A, B, C dan D require 1 crane each. The resource scheduling is based on using 3 cranes.

(i) Prepare a completed Critical Path Diagram for project IBS I in **Figure Q2**.

(4 marks)

(ii) Prepare a resource schedule using Table **Q2 (a)** for project IBS I

(4 marks)

(d) Suddenly, just before the project is to start, the project manager from IBS II (similar school project in Senai) requests 1 crane to be loaned to his project, and you agree.

(i) Analyse the revised project resource schedule using Table **Q2 (b)** to complete the project in 12 weeks using only 2 cranes. This is to be done using the parallell method for resource levelling (without activity splitting, multitasking or overtime) so that resources can be allocated effectively without exceeding resource limitations.

(8 marks)

SECTION B

Q3 Mr. Wong is the owner of a fish farm and he wishes to complete the activity of digging three fish ponds within 3 weeks. The cost of digging each fish pond is RM 2 000. However after 2 weeks, only one fish pond was dug whilst Mr. Wong had already spent RM 6 000.

(a) Calculate the schedule variance (SV) after a period of 2 weeks since the project was started.

(4 marks)

(b) Calculate the cost variance (CV)) after a period of 2 weeks since the project was started.

(4 marks)

(c) Draw the S-curve for Mr. Wong's project based on the analysis of the second week of the project's progress, indicating the graphs for Actual Cost of Work Performed (ACWP), Budgeted Cost of Work Performed (BCWP), Budgeted Cost of Work Scheduled (BCWS), and the SV and CV.

(9 marks)

(d) Discuss the efficiency of spending after the second week using Cost Performance Index (CPI).

(4 marks)

(e) Discuss the scheduling efficiency after the second week using Schedule Performance Index (SPI).

(4 marks)

Q4 A project requires twenty 1.2m diameter drilled and cast-in-situ piles that are each 14m long. The schedule for this workpackage consists of two activities:

(i) drilling the shafts; and
(ii) formwork, rebar and concrete placement for pile construction.

The productivity information is as follows:

- Drilling operations and spoil removal, is 1.4m per hour for the type of soil;
- A move, setup, and dismantle time of 3 hours for drilling equipment each time a new shaft is drilled (based on speed of movement of drill rig and distance from one hole to the next);
- Concrete placement rates are 15.3 cubic metres (m^3) per hour; and
- setting of prefabricated rebar cages and formwork will take 2 days per pile.

Assumptions:
The removal of the excavated soil or spoil is done concurrently with the drilling, and all drilling is completed before formwork, reinforcement work and concreting are carried out. Working hours are taken as 8 hours per day.

(a) Calculate the actual drilling duration in hours.

(4 marks)

(b) Calculate the move/setup/dismantle duration in hours for each new drilling activity.

(4 marks)

(c) Calculate the total drilling duration if the drilling crew works 8 hours per day at 100% efficiency:

(i) in hours;

(3 marks)

(ii) in days.

(3 marks)

(d) Calculate:

(i) the quantity of concrete required for each pile; and

(3 marks)

(ii) the duration in hours for performing the concreting for one pile.

(3 marks)

(e) Estimate the total duration in days (round off to whole numbers) to complete the construction of:

(i) one pile;

(2 marks)

(ii) the whole workpackage.

(3 marks)

Q5 It is common practice in construction projects to use the crashing technique to overcome project delay. Table **Q5** provides information related to a building project that is experiencing delay.

Table Q5 : Project Information

Activity	Preceded by	Normal Time (weeks)	Normal Cost (RM)	Crash Time (weeks)	Crash Cost (RM)	Slope CC-NC/NT –CT Crash Cost per week
A	-	6	200	2	400	
B	A	5	300	3	600	
C	A	4	100	2	300	
D	A	8	400	4	800	
E	C	6	700	4	1,000	
F	B,E	3	200	1	300	
G	C	5	300	4	400	
H	D	4	500	3	400	
I	H	3	400	1	600	
J	F,G	3	200	2	500	
K	J, I	2	300	1	400	

(a) Draw a precedence network diagram using the critical path method (CPM) for the building project according to the original project information provided in Table **Q5**.

(8 marks)

(b) Use the crashing method in order to resolve the problem of completing the building project according to the project information provided in Table **Q5** within a required period of 22 weeks without using the splitting or multitasking techniques.

(i) Explain the slope technique in choosing the activity to crash in Table **Q5**.

(4 marks)

(ii) Draw an updated CPM diagram after crashing the project that is to be completed within a period of 22 weeks.

(6 marks)

(iii) Prepare a project information table based on the crashed project data, including the individual activity costing.

(5 marks)

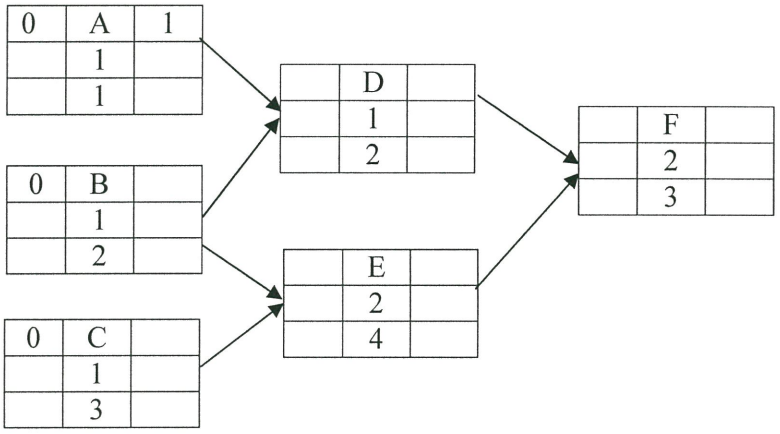
(iv) Calculate the cost of the project after it has been crashed to 22 weeks.

(2 marks)

- END OF QUESTION -

FINAL EXAMINATION

SEMESTER/SESSION: SEM II 2013/2014 PROGRAMME: 3 BPC
COURSE NAME : CONSTRUCTION MANAGEMENT COURSE CODE: BPD 33903



LEGEND:

ES	ID	EF
SL	RES	SL
LS	DUR	LF

Figure I Q2. : Schedule for Project IBS I

FINAL EXAMINATION

SEMESTER/SESSION: SEM II 2013/2014 PROGRAMME: 3 BPC
COURSE NAME : CONSTRUCTION MANAGEMENT COURSE CODE: BPD 33903

Table Q2 (a): Original Resource Scheduling

ID	RES	DUR	ES	LF	SLK	0	1	2	3	4	5	6	7	8	9	10	11	12
Resources scheduled																		
Resources available						3	3	3	3	3	3	3	3	3	3	3	3	3

Table Q2 (b): Resource-constrained Scheduling

ID	RES	DUR	ES	LF	SLK	0	1	2	3	4	5	6	7	8	9	10	11	12
Resources scheduled																		
Resources available						2	2	2	2	2	2	2	2	2	2	2	2	2