UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESI 2011/2012

COURSE NAME	:	PROJECT PLANNING AND SCHEDULING
COURSE CODE	:	BPD 3113/BPD 33903
PROGRAM ME	:	3 BPC
EXAMINATION DATE	:	JUNE 2012
DURATION	:	3 HOURS
INSTRUCTIONS	:	SECTION A ANSWER **ALL** QUESTIONS SECTION B ANSWER **TWO** QUESTIONS OUT OF THREE QUESTIONS ATTACH APPENDIX I,II,III AND IV WITH YOUR ANSWER BOOKLET

THIS QUESTION PAPER CONSISTS OF **TWELVE (12)** PAGES

SECTION A (60 marks)

Q1 Construction project management requires a few techniques and methods in order to ensure that the client's requirements can be achieved in terms of time, cost and quality.

    (a) Explain briefly the project performance measures listed below that are used to control construction projects:

        (i) Budgeted Cost of Work Scheduled (BCWS)

                (2 marks)

        (ii) Earned Value (EV)

                (2 marks)

        (iii) Actual Cost of Work Performed (ACWP)

                (2 marks)

    (b) Costs associated with a project can be classified as direct costs or indirect costs. Explain briefly the following terms:

        (i) Direct Cost

                (2 marks)

        (ii) Indirect Cost

                (2 marks)

    (c) State **TWO (2)** advantages and **TWO (2)** disadvantages of Critical Path Method (CPM) technique as a tool to assist in the management of projects.

                (4 marks)

Table Q1 : Project Information

Activity	Preceded by	Normal Time (wks)	Normal Cost (RM)	Crash Time (wks)	Crash Cost (RM)
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

(d)   Use the crashing method in order to resolve the problem of completing the project according to the required period of 21 weeks; answers to question **Q1 (d) (i), (ii) and (iii)** are to be based on **Table Q1**:

(i)   Draw a precedence network diagram using the critical path method (CPM) for the project.

(6 marks)

(ii)   Identify the critical path of the CPM diagram drawn in **Q1 (d) (i)**.

(2 marks)

(iii)   Draw an updated CPM diagram, as well as provide a project information table based on the action of crashing the project in order to complete the project within a period of 21 weeks.

(10 marks)

(iv)   Calculate the cost of the project after it has been crashed to 21 weeks.

(2 marks)

Q2 Construction project information that is accurate and easy to access during monitoring and decision making can help in productivity improvement of a project.

(a) Explain the following reports that are used in the process of monitoring and decision making.

(i) Weekly reports

(2 marks)

(ii) Monthly reports

(2 marks)

(iii) Trend reports

(2 marks)

(b) One of the methods that can be used for the purpose of project planning that has repetitive activities is that of Linear Scheduling. The following information in **Table Q2** below refers to a piping project of 5, 000 m length.

Table Q2: Productivity and Duration of Piping Project Activities

ID	Activity	Productivity (meter per day)	Activity Precedence	Duration for 5, 000 m (days)
1	Land Survey and Layout	500	-	10
2	Site Clearance	400	1	13
3	Trench Excavation	200	2	25
4	Pipe Laying	300	3	17
5	Backfill	250	4	20

(i) Draw a Velocity Diagram using graph paper provided to indicate clearly activities that are scheduled so as to have a conflicting situation.

(6 marks)

(ii) Draw a Velocity Diagram stating clearly the buffer between subsequent activities that needs to be considered in the planning and scheduling answer to **Q2 (b) (i)** in order to avoid conflicts.

(6 marks)

(iii) Determine the estimated completion period for the project planned in **Q2 (b) (ii)** that does not have conflicts.

(2 marks)

(c)   Completing a construction project within the specified completion period, especially for complex projects, poses a major challenge for the proejct manager. Delay in completing the project according to the specified completion period can be classified into three categories.

Explain the **THREE (3)** categories of project delay.

(6 marks)

SECTION B (40 marks)

Q3   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 Batu Pahat, and you have prepared the project schedule involving the use of cranes as the main resource based on information in **Figure I Q3** in Appendix I. The resource scheduling is based on using 3 cranes. Suddenly, you have a request from the project manager from IBS II (similar school project in Muar) who persistently requests 1 crane to be loaned to his project, and you finally agree.

Activity E dan F requires 2 'cranes', and activity A, B, C dan D require 1 crane each. The process of resource levelling using the parallell method is to be used (without activity splitting, multitasking or overtime) with the aim of allocating resources effectively without exceeding resource limitations. Complete **Figure I Q3** for IBS I in Appendix I and prepare a resource schedule using **Table I Q3 (c) (i)** and **(ii)** found in Appendix II in order to complete the project in 12 weeks using only 2 cranes.

(11 marks)

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Q4 Information regarding activities for undertaking a certain project are provided in **Table Q4** below.

Table Q4: Project Data

Activity	Preceded by:	Followed by:	Duration (wks)	Activity Cost (RM)
A	-	B, C, D	2	4 000
B	A	E	2	5 000
C	A	F	5	1 000
D	A	G	3	3 000
E	B	H	4	2 000
F	C	H	2	1 200
G	D	I, J	5	2 000
H	E, F	I	7	7 700
I	H, G	K	3	9 000
J	G	K	6	3 000
K	I, J	L	3	6 000
L	K	-	4	4 800

(a) Draw a critical path method precedence diagram for this project.

(5 marks)

(b) Use the format provided in **Table Q4 (b) (i) and (b) (ii)** found in Appendix III to answer the following questions:

   (i) State the earliest project completion time.

(1 mark)

   (ii) Calculate the Early Start (ES), Early Finish (EF), Late Start (LS), Late Finish (LF), Total Float (TF) for all activities, and indicate the critical path in the form of a table.

(3 marks)

(c) Assume that activity E is delayed by two weeks, activity H is delayed by one week and activity K is delayed by three weeks.

   (i) Draw a critical path method diagram (CPM) to represent the revised schedule.

(4 marks)

   (ii) State the new earliest project completion period.

(1 mark)

   (iii) Calculate the Early Start (ES), Early Finish (EF), Late Start (LS), Late Finish (LF), Total Float (TF) for all activities, and indicate the critical in **Table Q4 (c) (iii)** found in Appendix IV.

(4 marks)

   (iv) Determine the project cost based on the revised schedule.

(2 marks)

Q5   Resource management is an important aspect of programme planning or network planning for a construction project.

(a)   State **FIVE (5)** assumptions made in project planning using the critical path method (CPM).

(5 marks)

(b)   Mr. Akmal 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 1,000. However after 2 weeks, only one fish pond was dug whilst Mr. Johan had already spent RM 3,000.

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

(2 marks)

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

(2 marks)

(iii)   Draw the S-curve for Mr. Johan's project based on the analysis of the second week of the project's progress.

(5 marks)

(iv)   Calculate the Cost Performance Index of the project after the second week.

(3 marks)

(v)   Calculate the Schedule Performance Index of the project after the second week.

(3 marks)

END OF QUESTION PAPER

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0	A	1
	1	
	1	

	D	
	1	
	2	

0	B	2
	1	
	2	

	E	
	2	
	4	

0	C	
	1	
	3	

	F	
	2	
	3	

LEGEND:

ES	ID	EF
SL	RES	SL
LS	DUR	LF

Figure I Q3. : Schedule for IBS I Project

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Table Q3 (i): 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 Q3 (ii): 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

Appendix III

FINAL EXAMINATION

SEMESTER	: II 2011/2012		PROGRAMME	:	3 BPC
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Use Table Q4 below to answer Q4 (b) (i) dan Q4 (b) (ii)

Table Q4

Activity	Duration (wks)	ES	EF	LS	LF	TF	Critical? (Yes/No)

Answer: Q4 (b) (i) ....

       Q4 (b) (ii) *Use Table I above*

Appendix IV

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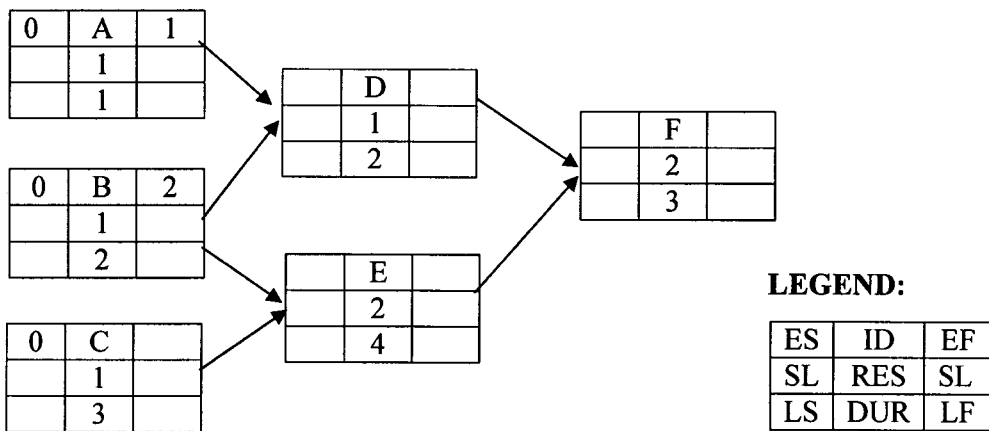SUBJECT NAME   :   PROJECT PLANNING   SUBJECT CODE   :   BPD3113/ BPD33903
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Use Table Q4 (c) (iii) below to answer Q4 (c) (iii).

Table Q4 (c) (iii)

Activity	*Duration (wks)*	ES	EF	LS	LF	TF	*Critical? (Yes/No)*	*Activity Cost (RM)*

Answer : Q4 (c) (ii) ....

         Q4 (c) (iv) ....