

EXAMINATION INTERNAL VERIFICATION FORM (2017-2018)

MODULE :	PSDE 6019 – Major Project (PMan)			LEVEL:	6
PROGRAMME :	BSc Electrical and Electronic Engineering			TERM OF EXAM: (SPRING OR SUMMER)	Summer
LEARNING OUTCOME(S) BEING ASSESSED:	All	EXAM PAPER:	Main	EXAMINATION AUTHOR :	M Hall

VERSION:	DATE SUBMITTED FOR VERIFICATION:	INTERNAL VERIFIER COMMENTS (Approval or detail of amendments required):	DATE:
1.	12/03/2018	<i>Conforms to the assessment pattern described in the module syllabus and tests the module learning outcomes appropriately.</i>	14-03-18
2.			

INTERNAL VERIFIER PLEASE TICK TO INDICATE THAT THE EXAMINATION:	
✓	Conforms to the assessment pattern described in the module syllabus
✓	Tests the module learning outcome(s) appropriately

SIGNATURES OF FINAL APPROVAL:	SIGNATURE	DATE
INTERNAL VERIFIER: I confirm that this version of the exam paper is ready to be sent to the external examiner	<i>R. Davies</i>	14-03-18
EXAM AUTHOR: I confirm that internal verifier and external examiner approval have been received and that this version of the exam paper is ready for printing.		

LOCATION: COLEG SIR GAR

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LEVEL 6

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EXAMINATION PERIOD

MAY 2018

CYFNOD ARHOLIADAU

MAI 2018

MODULE CODE: PSDE 6019

Project Management

TIME: 2 HOURS

TOTAL MARKS: 60

ANSWER THREE QUESTIONS

Equipment or materials required – Calculators are permitted

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Main paper

Question 1.

- a) Identify and describe 2 practical sources of risk in a project.
(4 Marks)
- b) Explain what is meant by Risk Exposure.
(2 marks)
- c) Define the term FMECA.
(4 marks)
- d) State and discuss the so called “4 T’s” with regards to risk resolution response.
(4 marks)
- e) State and discuss the 4 stages of a typical risk management strategy.
(4 marks)
- f) Define the term contingency in a project to minimise the implications of the identified risks.
(2 marks)

Total marks for Question 1 = 20

Question 2.

- a. Explain what is meant by the terms “Earned Value” and “Planned Value”.

(4 marks)

- b. The expenditure and progress of a project achieved at a certain point in time is shown in Table 2.1, calculate the missing values for the project.

	PV	EV	AC	SV	CV	SPI	CPI
Task A	£4,500	£4,000	£4,000				
Task B	£6,300	£6,300	£8,000				
Task C	£9,700	£9,500	£11,000				
Task D	£6,100	£2,000	£3,000				
Task E	£5,600	£1,000	£1,000				
Task F	£7,500	£7,500	£7,500				
Total	£39,700	£30,300	£34,500				

Table 2.1

(8 marks)

- c. Comment on the progress of each task.

(6 marks)

- d. Suggest how the project manager could mitigate any potential losses from the overall project.

(2 marks)

Total marks for Question 2 = 20

Question 3.

- a. Define a Work Breakdown Structure and explain the key advantages and disadvantages of the creation of a Work Breakdown Structure (WBS) in project planning.

(6 marks)

- b. The local health authority has approached your company to develop a computerised system to keep track of patient's progress in real time from any location within a hospital. The main computer will be a server system which will enable remote devices to access data for a particular patient. A database will be created to record and amend all patient data locally and remotely. The users will be allocated security ID's to gain access to the system server. The project involves subsystem installation, commissioning and support systems.

Prepare a WBS for this project.

(14 marks)

Total marks for Question 3 = 20

Question 4.

- a. Explain what is meant by the terms “Contribution Margin” and “Contribution Margin Ratio”, using formulae where appropriate.
(4 marks)
- b. A company is about to place a new product on the market. The variable cost per unit is £5 per unit. The fixed cost of production is £120,000. Given that the anticipated unit selling price is £9, calculate the breakeven volume for this product.
(2 marks)
- c. Define what is meant by the term payback analysis and compare the concepts of payback analysis and breakeven analysis.
(6 marks)
- d. Describe 3 methods of Breakeven Analysis.
(8 marks)

Total marks for Question 4 = 20

END OF PAPER

EXAMINATION SOLUTIONS

(to accompany the examination paper sent to the external examiner
but NOT to be seen by students)

MAY 2018

Programme:	BSc (Hons) Electrical & Electronic Engineering	Level:	6
Module:	PSDE 6019 Major Project		
Author:	Mike Hall	Pages:	6

Q 1	Question	Marks
a.	Any 2 from the following: Project Management: Lack of realistic scheduling for individual activities Project scope 'creep' where further project goals or deliverables are added to the project after the project has started. Developing Wrong Functions - (vague system requirements, system requirements not understood, systems requirements change, confusion between requirements and design). Collaborative contracts - defining a contract that all partners are happy with, managing responsibility within each partner, defining quality standards between partners, who takes overall responsibility for the project? Staff Key skills in existing staff - have they got the right skills to undertake the project's activities? If not, can they be trained? Loss of key personnel during the project Insufficient documentation of workflow and methodology - new staff have no idea of current work practice and progress made to date. Equipment / Systems Is the equipment available? Can it be delivered for when you need it? Equipment failure - building in time, establishing warranties, estimating time to repair or replace failed items and holding funds to replace failed equipment Does your company fully support your project - will they be able to provide the necessary infrastructure and resources.	

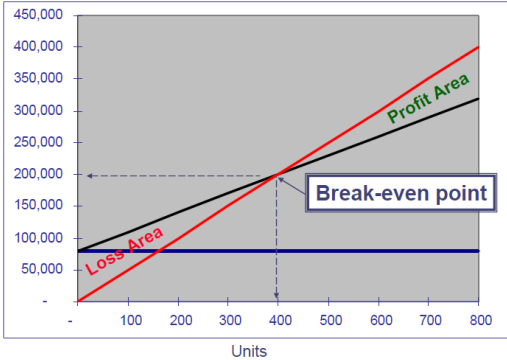
	Changes in technology - can you upgrade? Are designs based on established standards that will be able to provide future sustainability? External Project Factors Reliance on subcontractors - (expected availability / delivery late, component quality not reached, poor performance / reliability, lack of support, unpredictable costs, external tasks on critical paths and reliance on non-existent products) Customer Requirement Changes - no baseline for requirement changes to be related to, requirement changes rapid / uncontrolled, low threshold for changes, no configuration management system, underestimate of effects of change.	4
b.	Risk exposure (RE) is the product of the "probability of risk occurring" and "the financial loss due to the event occurring" for each task. i.e. $RE = \text{Prob of risk occurring} \times \text{financial loss}$.	2
c.	FMECA is an analysis technique which facilitates the identification of potential design problems by examining the effects of lower level failures on system operation. Its primary objective is to identify critical and catastrophic failure modes and to assure that potential failures do not result in an adverse effect on safety and system operation. It is used to analyze system hardware, processes, or functions for failure modes, causes, and effects.	4
d.	Terminate the Risk - By doing something differently so that the risk is removed at source (where it is feasible to do so). Alternatively countermeasures are put in place which either stop the threat occurring or if the threat does occur then they ensure that no impact on the project results. Treat the Risk - Reduce the probability of occurrence or reduce the loss should the risk occur so that the consequences are reduced to acceptable levels. Transference of the Risk - The management of the risk is passed to a third party via insurance (unusual in product design) or subcontracting (more usual). Note that this risk is not transferred unless high levels of confidence that the party accepting the risk is highly qualified to handle the risk. Tolerate the Risk - Perhaps nothing can be done at a reasonable cost to mitigate the risk. Then we must accept that the risk event can occur and that the consequences may be high. However that risk should not be ignored but instead	1 1 1

	monitored so should the event be inevitable then the company can determine whether to cancel the contract or not.	1										
e.	<table><tr><th>Activity</th><th>Description</th></tr><tr><td>Identify Risks</td><td>Use a list of categories of risks, or use a list of the key risks often encountered in the organization, to decide whether or not risks need to be handled</td></tr><tr><td>Analyse Risks</td><td>Review identified risks with a small team and determine how threatening they are to the project</td></tr><tr><td>Plan Risk Handling Actions</td><td>Include plans for the top 1 or 2 risks in the project work</td></tr><tr><td>Track and Control Risks</td><td>Monitor risk mitigation activities like other project actions, watch for additional risks to add to those handled</td></tr></table>	Activity	Description	Identify Risks	Use a list of categories of risks, or use a list of the key risks often encountered in the organization, to decide whether or not risks need to be handled	Analyse Risks	Review identified risks with a small team and determine how threatening they are to the project	Plan Risk Handling Actions	Include plans for the top 1 or 2 risks in the project work	Track and Control Risks	Monitor risk mitigation activities like other project actions, watch for additional risks to add to those handled	4
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f.	Contingency is the provision of adequate time or resources (money and manpower) to resolve problems if they arise. Contingency should be built into the project budget and time plan, and should be available to the project manager to manage as their discretion allows. Contingency budgets should be based on the project risk exposure value.	2										
Total marks for Q1		20										

Q 2	Question	Marks																																																																
a.	Earned Value is an approach where you monitor the project plan, actual work, and work completed value to see if a project is on track. Earned Value shows how much of the budget and time should have been spent, with regard to the amount of work done so far. Planned value is how much the project is estimated to cost, in effect the “quote	3 1																																																																
b.	<table><tr><td></td><td>PV</td><td>EV</td><td>AC</td><td>SV</td><td>CV</td><td>SPI</td><td>CPI</td></tr><tr><td>Task A</td><td>£4,500</td><td>£4,000</td><td>£4,000</td><td>-£500</td><td>£0</td><td>0.89</td><td>1.00</td></tr><tr><td>Task B</td><td>£6,300</td><td>£6,300</td><td>£8,000</td><td>£0</td><td>-£1,700</td><td>1.00</td><td>0.79</td></tr><tr><td>Task C</td><td>£9,700</td><td>£9,500</td><td>£11,000</td><td>-£200</td><td>-£1,500</td><td>0.98</td><td>0.86</td></tr><tr><td>Task D</td><td>£6,100</td><td>£2,000</td><td>£3,000</td><td>-£4,100</td><td>-£1,000</td><td>0.33</td><td>0.67</td></tr><tr><td>Task E</td><td>£5,600</td><td>£1,000</td><td>£1,000</td><td>-£4,600</td><td>£0</td><td>0.18</td><td>1.00</td></tr><tr><td>Task F</td><td>£7,500</td><td>£7,500</td><td>£7,500</td><td>£0</td><td>£0</td><td>1.00</td><td>1.00</td></tr><tr><td>Total</td><td>£39,700</td><td>£30,300</td><td>£34,500</td><td>-£9,400</td><td>-£4,200</td><td>0.76</td><td>0.88</td></tr></table>		PV	EV	AC	SV	CV	SPI	CPI	Task A	£4,500	£4,000	£4,000	-£500	£0	0.89	1.00	Task B	£6,300	£6,300	£8,000	£0	-£1,700	1.00	0.79	Task C	£9,700	£9,500	£11,000	-£200	-£1,500	0.98	0.86	Task D	£6,100	£2,000	£3,000	-£4,100	-£1,000	0.33	0.67	Task E	£5,600	£1,000	£1,000	-£4,600	£0	0.18	1.00	Task F	£7,500	£7,500	£7,500	£0	£0	1.00	1.00	Total	£39,700	£30,300	£34,500	-£9,400	-£4,200	0.76	0.88	8
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c.	Task A is 89% complete and on schedule Task B is complete, but with an overspend of £1700 Task C is 98% complete and has an overspend of £1500 Task D is 33% complete and over schedule for the work done so far Task E has £4600 worth of work left to do, but is already overspent by £6000 Task F is completed and on schedule As a whole, the project is behind schedule by £9400 and is 76% complete. It is also running at a loss of £4200 to date and is 12% overspent.	6																																																																
d.	Tasks B and F are both complete and therefore have no leeway. Tasks A and C are nearly complete so again there is little scope to make up the loss. Savings will have to be made when completing tasks D & E, although an overall loss for the project is likely.	2																																																																
	Total marks for Q2	20																																																																

Q 3	Question	Marks
a.	WBS forces the team to create detailed steps (planning) The WBS forces the project manager, team members, and customers to delineate the steps required to build and deliver the product or service. The exercise alone encourages a dialogue that will help clarify ambiguities, bring out assumptions, narrow the scope of the project, and raise critical issues early on. WBS lays the groundwork for schedule and budget (budgeting) It lays the groundwork for developing an effective schedule and good budget plans. A well-defined WBS enables resources to be allocated to specific tasks, helps in generating a meaningful schedule, and makes calculating a reliable budget easier. WBS creates accountability (time) The level of detail in a WBS makes it easier to hold people accountable for completing their tasks. With a defined WBS, people cannot hide under the "cover of broadness." A well-defined task can be assigned to a specific individual, who is then responsible for its completion WBS creation breeds commitment (commitment) The process of developing and completing a WBS breeds excitement and commitment. Although the project manager will often develop the high-level WBS, he will seek the participation of his core team to flesh out the extreme detail of the WBS. This participation will spark involvement in the project. Downsides (choose 2 from): 1. Can be a painstaking process which can take a long time for large complex projects. 2. Requires continual refinement. 3. The larger the scope of the project, more people must provide input and approve their section of the project.	1 1 1 1 2

b.	Student answer to be marked on detail of the WBS, no single answer is possible, each student will produce their own version. Typical level detail required indicated below. 1. Specification 1.1. Specification of Database Interfaces 1.1.1. Prescription Medication Interface 1.1.2. Patients Record Interface 1.2 User Interface Specification 1.2.1 Doctors Interface 1.2.2. Administrator Interface 2. Design 2.1. Systems Design 2.1.1. Standardisation Requirements 2.1.2. Functional Partitioning 2.2 User Interface Design 2.2.1 User Screen Prototyping 2.2.2 User Interface Code Design 2.3 Database Interface Code design 2.3.1. Prescription Interface Design 2.3.2 Patients Interface Design 3. Test 3.1. Test Plan 3.2. Unit Testing 3.2.1 Prototype Display Demonstrations 3.2.2 User Interface testing 3.2.3 Database Interface testing 3.3 Integration Testing 4. Commissioning 4.1 Installation Plan 4.1.1 Site Surveys 4.1.2 Installation Plans 4.2 Equipment Procurement 4.2.1 Procurement Specifications 4.2.2 Facility Procurement 4.3 Installation 4.3.1 Electrical / Cabling systems 4.3.2 Code Installation	14
	Total marks for Q3	20

Q 4	Question	Marks
a.	Contribution Margin (CM) is the amount remaining from sales revenue after variable expenses have been deducted.	2
	e.g. $CM = \text{Sales revenue} - \text{variable expenses}$	
	Contribution Margin Ratio is the percentage ratio between the contribution margin and the total sales. e.g. $CM \text{ Ratio} = \text{Total CM} / \text{Total sales}$.	2
	b. $\text{Contribution Margin} = \text{Unit Price} - \text{Variable Costs}$	2
	Therefore $CM = 9 - 5 = \text{£}4$	
	Breakeven Volume = $\text{Fixed Production Costs} / CM = 120000 / 4 = 30,000 \text{ units}$	
	c. Payback analysis is the length of time required to recover the cost of an investment. The payback period of a given investment or project is an important determinant of whether to undertake the position or project, as longer payback periods are typically not desirable for investment positions.	6
	The better investment is the one with the shorter payback period. For example, if a project costs £100,000 and is expected to return £20,000 annually, the payback period will be $\text{£}100,000 / \text{£}20,000$, or five years.	
	The breakeven analysis is to determine the point at which revenue received equals the costs associated with receiving the revenue. It determines the number of units that need to be sold to reach this point.	
	d. Equation Method:	2
	Profits = $\text{Sales} - (\text{Variable expenses} + \text{Fixed expenses})$	
	At the breakeven point, profits = £0	2
	Contribution Margin Method:	2
	Breakeven point = $\text{Fixed expenses} / \text{Unit contribution margin}$	
	Graphical Method:	4
		
Total marks for Q4		20

