



PROGRAM : **BTech - MINING**

SUBJECT : **ENGINEERING MANAGEMENT IVB (S6)**

CODE : **MGNB 411**

DATE : **SUMMER EXAMINATION 2016**  
**29 NOVEMBER 2016**

DURATION : **(SESSION 1) 08:30 - 11:30**  
: **180 MINUTES**

TOTAL MARKS : **120**

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EXAMINER : **Mr. Maelani Chauke**

MODERATOR : **Mr. Mpho Tlala**

NUMBER OF PAGES : **4 PLUS FORMULAE SHEET (1 PAGE)**

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**INSTRUCTIONS:**

1. There are 6 questions herein. **PLEASE do not answer all questions**
  2. Questions 2; 3; and 4 are **compulsory**. Answer these questions.
  3. In addition to questions 2, 3, and 4, one more question must be answered. In total four questions must be answered. The four questions must add up to a total mark of 120.
  4. Except for questions 1 and 5, which together add up to 30 marks, all the other questions have each been allocated equal marks of 30
  5. A questions means all the sub-questions that appear under the heading of that specific question.
  6. IFF you choose question 1, then question 5 becomes compulsory for you, and vice versa. Number all questions, and sub-questions **CLEARLY**
  7. A formulae sheet is herein attached
  8. The use of a calculator is permissible
  9. All the relevant rules of the University of Johannesburg shall apply
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### **Question 1**

- 1.1 List five advantages of sound employment relations? [5]
- 1.2 List the three role players in the tripartite employment relationship [3]
- 1.3 What is a contract of employment? Explain in your own words [2]

### **Question 2**

An electronics plant is experiencing soldering rejects on printed circuit (PC) boards. People at the plant decide to analyse the process to see what can be done. They begin by calling together a group of people to get their thoughts. The group is made up of engineers, solder machine operators, inspectors, buyers of materials, production control specialists, and others. All the groups in the plant who have anything to do with PC boards are represented, which is necessary to get the broadest possible view of the factors that might affect the process output.

The group is told that the issue to be discussed is the solder defect rate and the objective is to list all the factors in the process that could probably have an impact on the defect rate. The group uses brainstorming to generate the list of possible causes.

The list generated is indicated in table 1 below

**Table 1: List of factors that could cause the effect of solder defects**

Machine	Solderability	Operator
Solder	Conveyor speed	Temperature
Operator attitude	Materials	Parts
Conveyor angle	Operator attention	Flux
Age of parts	Wave height	Cleanliness
Specific gravity	Age of boards	Part preparation
Skill	Board vendors	Type of flux
Instruments	Machine maintenance	Training
Handling	Vibration	Storage
Air quality	Lighting	Calibration
Wait-time	Humidity	Contamination

2.1 Construct a cause-and-effect diagram incorporating all these ideas [20]

2.2 In your own words, explain 'process performance'; and the characteristic or factors that indicate that a process is in control [5]

2.3 What are the typical elements of a process? [3]

2.4 What are the two parameters that we need to know, which can be derived from the process' own distribution data, to express process variability? [2]

### **Question 3**

3.1 In your own words, explain the purpose and benefits of the use of models in maintenance [5]

3.2 Give an overview of the input-output model for the maintenance systems. The use of a sketch or figure is recommended [10]

3.3 The maintenance system, just like any system, must be properly managed. The functions that apply to the management of the maintenance system, and general maintenance management framework have been formulated (e.g. Visser (1997)).

Summarise, and briefly explain, the essential elements of a maintenance management framework (i.e. the use of an appropriate figure is recommended).

[10]

3.4 The failure characteristics of a switch in an electrical distribution board have a Weibull distribution. The value of the shape parameter,  $m$ , is 3.5 and the characteristic life,  $\Theta$ , is 60 days. Calculate reliability after 45 days and after 85 days.

[5]

### **Question 4**

4.1 Distinguish between 'risk' and 'hazard' [5]

4.2 Summarize the advantages and disadvantages (pros and cons) of the four risk models that you are familiar with. The use of an appropriate table is recommended.

[10]

4.2 How would you go about evaluating the usefulness of risk model? What are the typical features or characteristics you would use in your evaluation? [5]

4.3 In your own words, explain 'Total Risk Management' [3]

4.4 List at least seven cost elements of an industrial accident [7]

### **Question 5**

5.1 Discuss the information system in the value chain of an operation (and applicable to mining) [5]

5.2 Within the context of technology management, and in your own words, explain the terms below: [5]

- 5.2.1 Acquisition
- 5.2.2 Exploitation
- 5.2.3 Identification
- 5.2.4 Technological capability
- 5.2.5 Innovation

5.3. Distinguish between strategic planning and strategic thinking. The use of an appropriate table is recommended [10]

### **Question 6**

6.1 Describe the purpose of various financial statements [6]

6.2 Describe the various elements of a budget report [4]

6.3 Briefly describe how you would set up an annual budget for your department. Explain how you would control performance against the budget [10]

6.4 Determine the replacement cost of a piece of equipment in five years' time. The cost of this equipment now is R192 000 and the escalation rate is projected to be 10.5%. What uniform sum of money must be set aside each year if you want to establish a sinking fund that will retire the obligation in five years' time? Your company receives an interest rate of 11% from the bank for money invested. [10]

**[TOTAL MARK = 120]**

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