UNIVERSITY OF JOHANNESBURG

PROGRAM	:	BACHELOR OF TECHNOLOGY *ENGINEERING: INDUSTRIAL*
SUBJECT	:	**INFORMATION SYSTEMS 4**
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TOTAL MARKS	:	100

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MODERATOR	:	MR L.N BALOYI
NUMBER OF PAGES	:	5 PAGES

INSTRUCTIONS TO STUDENTS

PLEASE ANSWER ALL QUESTIONS.
ANSWER THE QUESTIONS IN SEQUENCE

REQUIREMENTS
ONLY ONE POCKET CALCULATOR PER CANDIDATE MAY BE USED.
GRAPH PAPER

QUESTION 1

You are currently acquiring data from System Users to write a User Story. You opted to conduct interviews with some of the users. In preparation for interviews, discuss three structures that will assist you to arrange questions. Provide relevant examples to support your answer. **(9 Marks)**

QUESTION 2

Mayibuye Engineering Solution is a company that manufactures electronic components for various customers. The enterprise consists of one Finance Department, one Production Department, two Storage Areas that stores raw material and finished units. The Production Department has at least three workstations. At least one Plant Engineer is required to declare the Production Line safe and ready before the production works begin. Based on the workstation's configuration, it is required that two Mechanical Engineers are always available on the production line to sustain the machine's uptime. The production line also consists of one Industrial Engineer per shift who monitors the production efficiencies. At least five Electrical Engineers are stationed in the production line to conduct the testing on the finished units.

As a Systems Analyst, you are required to present the Entity-Relationship Model (E-R) for this enterprise. On your Model, depicts the Fundamental Entities, Attributive Entities and Associative Entities. It is also required that your entities are furnished with at least three attributes. Denote the Primary Keys with UNDERLINE and Foreign Key with STARS ***.

State all your assumptions. **(17 Marks)**

QUESTION 3

According to the Occupational Health and Safety Act, the acceptable noise level of an industrial machine should be equal or less than 80dB and the temperature should be equal or less than 60 °C. Any value above 80dB and 60 °C is considered too noisy and overheating respectively. The machine that causes a power trip is deemed unsafe.

An Artisan works on the milling machine to produce the cylindrical shapes. The following conditions and actions are considered when using the machine.

Report the fault to the Technician if:

• The machine causes a power trip with the noise level above 80dB and the machine temperature is above 60°C

• The machine causes a power trip with the noise level above 80dB even though its temperature is below 60°C

• The machine does not cause a power trip but the noise level is above 80dB and its temperature is below 60°C

Repair the fault if:

• The machine does not cause a power trip and produces noise level less than 80dB but the temperature reading surpasses 60°C

• The machine does not cause a power trip, but the noise level is above 80dB with temperature of 62°C

• The machine temperature is greater than 60°C and the noise level is less than 80dB but causes a power trip

Continue with production if:

• The machines does not cause a power trip, the machine temperature is less than 60°C and the noise level remains at an acceptable level.

Construct a decision table that will assist an Artisan to take appropriate decisions based on the conditions combinations. Which of these conditions have a high influence on the action to be taken? **(16 Marks)**

QUESTION 4

A young Mechanical Fitter (MF) got a new job at Vilela Metal and Plastic Engineering Solution. Her fundamental roles and responsibilities include working on the Machinery Systems. Her orientation was based on machine functionalities, capabilities and operations steps. The process of operating the machine and produce the required units are as follows:

> *The Mechanical Fitter (MF) Set-up the machine accordingly as per OEM procedures. The setting-up of the machine requires the MF to also Monitor the machine for unusual sounds or vibrations. If there are unusual sounds and vibrations, the MF Reports the fault to Mechanical Technician (MT). The MT fixes the faults, which include handing over the machine back to the MF for production. The MF Insert material into machines, either manually or with a hoist. The MF then operates the machine to molds and casts the unit. The MF adjusts machine settings for temperature, cycle times, and speed. When molding and casting activities are completed, the MF then removes finished units from the machine, which includes the smoothening of rough edges. The MF conducts a Test to compare the finished units to specifications. After the production, the MF switches off the machine and documents production numbers in a computer database.*

a) Present the Use Case Diagram that will assist the Technician to understand the production model. Your model should clearly depict Primary Actor, Secondary Actor, Generalize Relationship, Communicate Relationship, and <<Include>> and <<Extend>> relationship **(10 Marks)**
b) Present the USE CASE scenario for the fault reporting use case. Your Use Case Scenario Model should have at least four steps. **(12 Marks)**

State all your assumptions.

QUESTION 5

Suppose you were just hired as System Analysts in ABC Enterprises. As you are busy reviewing the quality assessment study that was conducted by the previous Systems Analyst for the orders that contain errors. You discover that the sample size used was 44 orders. Assuming that the confidence level used was 80% errors with an acceptable interval estimate of ±0.05. Determine the population proportion for this study. **[7 Marks]**

QUESTION 6

You are a System Analyst within the Capital Projects Department. The Portfolio has Program and one program consist of many projects that are scoped towards similar objectives. The program also has a quarterly program review session that takes place to assess the progress of the program. The projects are classified as budgeted or unbudgeted projects.

Please Model the Class Diagram for the above scenario. Furnish each entity with at least two Attributes and two Methods/Operations **(12 Marks)**

QUESTION 7

As a student, if you want an official academic record, you consult the Registrar's office. Upon arrival, you are required to provide a student number. When the student number is entered into a computer, the name, degree, and student address is automatically brought up on the screen. This information is retrieved from the storage system called D1: StudentInfoDataBase. Once the student particulars are verified, the financial standing from D2:StudentFinanceDatabase is evaluated to check if there is any amount due to university. The financial standing assessment determines the amount to be paid to the university. If the student owes the university, they will be requested to settle the balance. Thereafter, an official academic record is retrieved from the D3: ResultsDatabase. The student is requested to pay the printout fare and the printout is issued to the student.

a) Develop the Context Diagram **(5 Marks)**

b) Explode the Context Diagram in (a) into the Physical Data Flow Diagram (**12 Marks)**

A table of area under a normal curve

Confidence Level	Confidence Coefficient (*z* value)
99%	2.58
98	2.33
97	2.17
96	2.05
95	1.96
90	1.65
80	1.28
50	0.67

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

The End