Index Number: _____ SEC37/s3.23s



MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL 2023 SUPPLEMENTARY SESSION

SUBJECT: Engineering Technology

PAPER NUMBER: Synoptic – Unit 3
DATE: 2nd November 2023
TIME: 2:30 p.m. to 4:35 p.m.

THIS PAPER SHOULD BE RETURNED TO THE INVIGILATOR AFTER THE EXAMINATION.

For examiners' use only:

Question	1	2	3	4	5	6	7	8	Total
Score									
Maximum	6	8	8	8	8	8	12	12	70

Answer **ALL** questions in the space provided.

Scenario

- A technician employed with a mechanical and electrical engineering company is required to answer the following questions.
- These questions relate to the technical information required to safely construct, use and maintain electro-mechanical systems using a range of power tools.

Question 1	K-1 (6 marks)
a. Name FOUR different types of electrical power g	eneration plants.
Type 1:	(0.5)
Type 2:	(0.5)
Type 3:	(0.5)
Type 4:	(0.5)
b. Define the following terms in relation to electrical	power:
Generation of electrical power	
	(1)
Distribution of electrical power	
	(1)
	(1)
c. Describe the FIVE stages how electrical power tra the consumer.	nsit from the generation plant until it reaches

estion 2		K-5 (8 mark
	nd servo motors are motor types. List TW	
ype 2:		
	oper and servo with their typical application	
	Typical Application	
	Table 1: Motor Appl	ications.
Match step	Table 1: Motor Appl Typical Application	Type of Motor

List FOUR different types of bearings. Type 1:		
Servo Motor:		
Iestion 3 K-6 (8 mark List FOUR different types of bearings. Type 1:		(
List FOUR different types of bearings. Type 1:	Servo Motor:	
List FOUR different types of bearings. Type 1:		
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List FOUR different types of bearings. Type 1:		
List FOUR different types of bearings. Type 1:		(
List FOUR different types of bearings. Type 1:		
Type 1:	uestion 3	K-6 (8 marl
Type 2:	List FOUR different types of bearings.	
Type 2:	Tyne 1:	((
Type 3:		·
Type 4:		·
A bearing can fail prematurely due to a number of factors including an incorrect fit. Identify another TWO different factors that may cause a bearing to fail prematurely from ones provided below. Iighter load than designed for ineffective bearing sealing inadequate lubrication low operating temperature Failing Factor 1:	Type 3:	(0
Identify another TWO different factors that may cause a bearing to fail prematurely from ones provided below. lighter load than designed for ineffective bearing sealing inadequate lubrication low operating temperature Failing Factor 1:	Type 4:	(0
low operating temperature Failing Factor 1:	Identify another TWO different factors that ma	_
	Failing Factor 1:	
Failing Factor 2.	Failing Factor 2:	

Outline TWO methods how different bearings can be	·	
1ethod 1:		
		(2)
lethod 2:		

Question 4 K-7 (8 marks)

a. Identify the mechanical systems given in Table 2.

Table 2: Mechanical Systems.

	Table 2: Mechanical Systems.	
	Mechanical system	Name
i.	(Source: https://istockphoto.com)	(0.5)
ii.	(Source: https://grahcad.com)	(0.5)
	(Source: https://grabcad.com)	

This question continues on next page.

	iii.	(Source: https://www.freeiconspng.com/)	(0.5)
	iv.	(Source: http://resource.download.wjec.co.uk.s3.	(0.5)
L	D	amazonaws.com/)	
		ribe TWO functions of mechanical systems.	
			(1)
	Funct	ion 2:	
			(1)
c.	i. Lis	et ONE advantage and ONE disadvantage of gears:	
	Gears	s Advantage:	

_____(1)

		DO NOT WRITE ABOVE THIS LINE		
		s Disadvantage:		
_				
ii.	Li	st ONE advantage and ONE disadvantage of pulleys:		
Pu	ılle	ys Advantage:		
Pu	ılle	ys Disadvantage:		
Ques	sti	on 5	K-9 (8	marks)
a. Lis	st t	the FIVE main classes of fire against their type in Table 3.		
		Table 3	Class of Fire	٦
i.		Type of Fire Fires with flammable or combustible liquids as the fuel source	Class of Fire	(0.4)

	Type of Fire	Class of Fire	
i.	Fires with flammable or combustible liquids as the fuel source		(0.4)
ii.	Fires involving gases		(0.4)
iii.	Fires involving cooking oils		(0.4)
iv.	Fires with trash, wood, paper, or other combustible materials as the fuel source		(0.4)
٧.	Fires involving electrical equipment		(0.4)

- b. Identify the proper fire extinguisher for each of the fires mentioned below.
 - a. A fire in the back side of a fridge.

b. A fire in a car's fuel tank.

____(0.5)

c. A fire in a bedroom caused by the burning of clothes inside a wooden cabinet.

____(0.5)

d. Fire in a kitchen caused by the burning of cooking oil.

_____(0.5)

DO NOT WRITE ABOVE THIS LINE

 Describe TWO important practices to adopt when the building via the escape route to the assembly 	
	(4)
Question 6	K-10 (8 marks)
a. Define the following TWO terms:	
Copyright:	
	(1)
Plagiarism:	
	(1)
o. List FOUR different types of documentation wher	constructing an electro-magnetic product.
Type 1:	(0.5)
Type 2:	(0.5)
Type 3:	(0.5)
Type 4:	(0.5)

Describe the function of any TWO types of documentation listed in Question 6b.
(4
uestion 7 C-1 (12 marks
Outline the importance of selecting a fuse with the appropriate current rating in terms of: i. function.
ii. hazards that might arise when selecting inappropriate fuse.
(2

This question continues on next page.

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Calculate and choose the appropriate fuse rating for a toaster that has a maximum power consumption of 2,500 W, and the supplied voltage is 230 V. Show all your workings.						
(4)						
Discuss the main differences between an MCB and a fuse in terms of the following characteristics.						
Sensitivity to current overload:						
Ease to resume supply:(2)						
(2)						

Question 8 C-3 (1		marks)
a.	Describe the following preventative measures one should take before using a power t	ool.
	Ensure that you have been properly trained to use the tool:	
		(2)
	Ensure that the power tool has the correct guard:	
		(2)
b.	Describe the following safety measures one should take while using a power tool.	
	Keep power cords clear of tools and the path that the cutting tool will take:	
		(2)

This question continues on next page.

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	Make use of clamps or vices to hold and support the workpiece:		
		(2)	
c.	Explain TWO measures of maintenance and care of power tools and machinery.		
		(
			12
		(4)	ΙZ