



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2021

Technology
Higher Level

Monday, 28 June
Afternoon, 2:00 - 4:30

There are **three** Sections in this paper. Attempt **all three** Sections.

Section A: Core - Short-answer questions.

Section B: Core - Long-answer questions.

Section C: Options - Long-answer questions.

Section A - Core (72 marks)

Instructions:

- (a) Answer **any twelve** questions in the spaces provided.
 All questions in Section A carry 6 marks.
- (b) Draw all sketches in pencil.
- (c) Hand up this booklet at the end of the examination.
- (d) Write your examination number in the box provided
 and on all other pages used.

Examination Number

Centre Number

Section	Mark
Section A	
Section B	
Section C	
Total	
Grade	

Section A. Answer **any twelve** questions. All questions carry 6 marks.

1. Lighting company, SELC, was launched in 1982 in Belmullet, Co. Mayo. The company specialises in networked smart street lighting using Wi-Fi and radio signals.

Explain the benefits of **each** of the following features:

- (i) Dimmable LED lights replacing traditional lighting.

- (ii) Automated control of lighting rather than manual switching.



2. The SELC light controller uses a housing made from polycarbonate. Outline **two** reasons for the use of polycarbonate to house the controller.

1.

2.

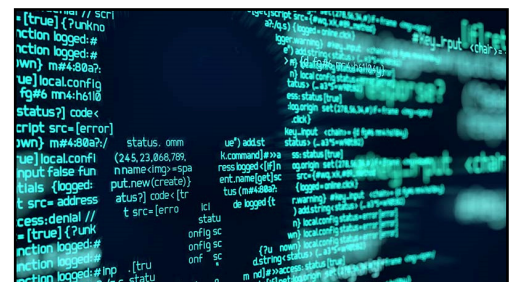


3. In December 2019, the U.S. Department of Justice charged the leader of an organised cyber-criminal group for his part in a global *Dridex* malware attack. The public are advised to ensure that electronic devices are patched, antivirus is turned on and updated, and files are backed up.

Explain the terms:

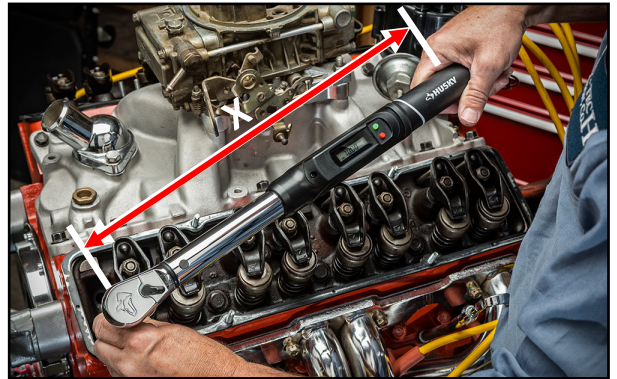
- (i) 'patched'.

- (ii) Antivirus.

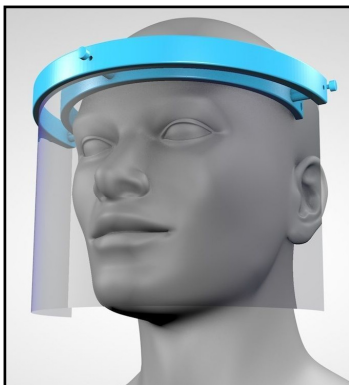


4. The torque wrench shown is set to deliver a torque of 206 N m. Calculate the force exerted by the operator to achieve this torque if $X = 700$ mm.

Calculation:



5. The faceshield shown consists of a 3D printed headband and a removable plastic sheet. Compile a Work Breakdown Structure (WBS) for the manufacture of the faceshield shown.



6. The *skin-frame* type structure has gained popularity in 3D printing for items such as the Voronoi mushroom lamp shown. This approach uses a combination of frame and shell structures.

Outline **two** reasons for the use of such a combined structure.

1. _____

2. _____



7. Amazon have used artificial intelligence (AI) to develop their virtual assistant, Alexa. The device is capable of undertaking a range of tasks including voice interaction, music playback, etc.

Alexa can be *paired* with devices such as lights and speakers. Outline the process of pairing electronic devices.



8. Outline **two** features that might be integrated into the bench-mounted belt sander shown, to reduce vibration and minimise dust.

1. Reduce vibration.

2. Minimise dust.



9. Electronic components can be distinguished by material, electrical properties, and use. Complete the table below.

Category	Material	Electrical Property	Use
Conductor	Copper	Allows current to pass through	Electrical wire
Insulator			
Semiconductor			

10. The helical-cut gears shown are mounted in a cast iron gearbox.

(i) State **two** reasons for using helical gears rather than straight spur gears.

1. _____

2. _____

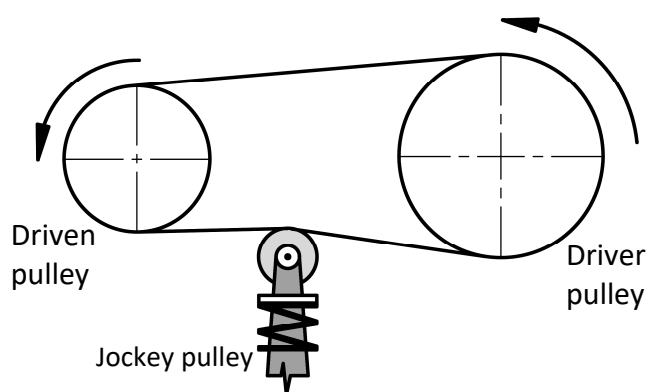


(ii) Describe how such a gear system could be lubricated.

11. The system shown has a driver pulley, diameter 40 mm, and a driven pulley, diameter 25 mm.

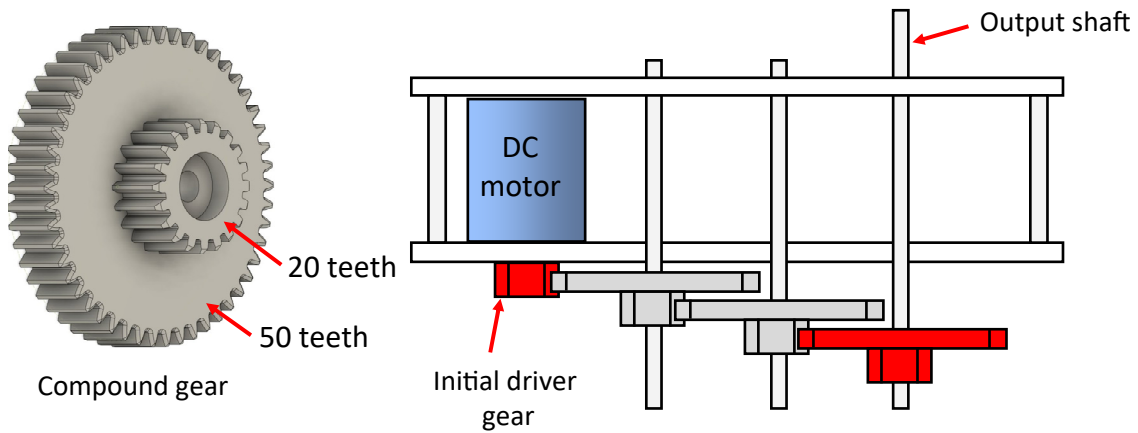
(i) Calculate the angular velocity (rotational speed) ratio of the system shown.

Calculation:



(ii) Explain the purpose of the spring-loaded jockey pulley.

12. The gearbox shown uses three identical compound gears. The initial driver gear (20 teeth) is secured to the motor. For each of the three subsequent compound gears, the driver gear has 20 teeth and the driven gear has 50 teeth.



If the motor runs at 2000 rpm, calculate the angular velocity (rotational speed) at the output shaft.

Calculation:

13. An exploded view of a retro games console is shown. Sketch a pictorial view of the *assembled* console.



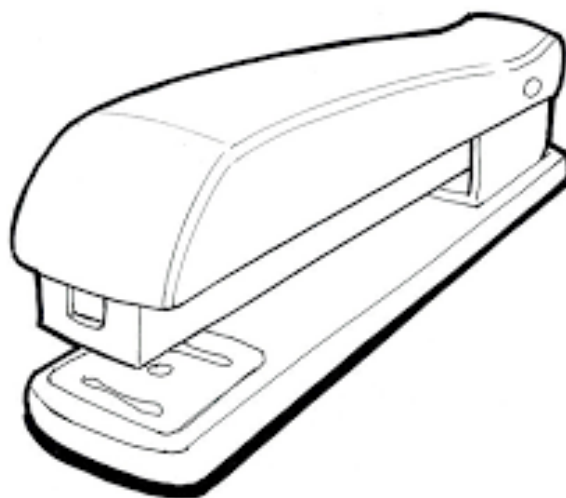
- 14.** The Irish-designed *Gúna* occasional table is shaped to emulate the elegant sweep of a dress. The table is produced by *laminating* lengths of oak and African wenge timber.

(i) Explain the lamination process.

(ii) Outline **two** reasons for reducing the use of tropical hardwoods such as wenge.



- 15.** Use **two** graphic techniques to enhance the representation of the materials used in the stapler shown.



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