**NAME and INDEX NO.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**FINAL EXAM**

**READ THE TEXT CAREFULLY AND ANSWER THE QUESTIONS BELLOW (12)**

The first steam-powered machine was built in 1698 by the English military engineer Thomas Savery (c. 1650-1715). His invention, designed to pump water out of coal mines, was known as the Miner's Friend. The machine, which had no moving parts, consisted of a simple boiler - a steam chamber whose valves were located on the surface - and a pipe leading to the water in the mine below. Water was heated in the boiler chamber until its steam filled the chamber, forcing out any remaining water or air. The valves were then closed and cold water was sprayed over the chamber. This chilled and condensed the steam inside to form a vacuum. When the valves were reopened, the vacuum sucked up the water from the mine, and the process could then be repeated.

A few years later, an English engineer named Thomas Newcomen (1663-1729) improved the steam pump. He increased efficiency by setting a moving piston inside a cylinder, a technique still in use today. A cylinder - a long, thin, closed chamber separate from the boiler - replaced the large, open boiler chamber. A piston - a sliding piece that fits in the cylinder - was used to create motion instead of a vacuum. Steam filled the cylinder from an open valve. When filled, the cylinder was sprayed with water, causing the steam inside to condense into water and create a partial vacuum. The pressure of the outside air then forced the piston down, producing a power stroke. The piston was connected to a beam, which was connected to a water pump at the bottom of the mine by a pump-rod. Through these connections, the movement of the piston caused the water pump to suck up the water.

The most important improvement in steam engine design was brought about by the Scottish engineer James Watt (1736-1819). He set out to improve the performance of Newcomen's engine and by 1769 had arrived at the conclusion: if the steam were condensed separately from the cylinder, the cylinder could always be kept hot. That year he introduced the design of a steam engine that had a separate condenser and sealed cylinders. Since this kept the heating and cooling processes separate, his machine could work constantly, without any long pause at each cycle to reheat the cylinder. Watt's refined steam engine design

used one-third less fuel than a comparable Newcomen engine.

Over the next 15 years, Watt continued to improve his engine and made three significant additions. He introduced the centrifugal governor, a device that could control steam output and engine speed. He made the engine double-acting by allowing steam to enter alternately on either side of the piston. This allowed the engine to work rapidly and deliver power on the downward and upward piston stroke. Most important, he attached a flywheel to the engine.

Flywheels allow the engine to run more smoothly by creating a more constant load, and they convert the conventional back-and-forth power stroke into a circular (rotary) motion that can be adapted more readily to power machinery. By 1790, Watt's improved steam engine offered a powerful, reliable power source that could be located almost anywhere. It was used to pump bellows for blast furnaces, to power huge hammers for shaping and strengthening forged metals, and to turn machinery at textile mills. More than anything, it was Watt's steam engine that speeded up the Industrial Revolution both in England and the rest of the world.

Steam was successfully adapted to powerboats in 1802 and railways in 1829. Later, some of the first automobiles were powered by steam. In the 1880s, the English engineer Charles A. Parsons (1854-1931) produced the first steam turbine, a new steam technology that was more efficient and which enabled the steam engine to evolve into a highly sophisticated and powerful engine that propelled huge ships and ran turbogenerators that supplied electricity.

Once the dominant power source, steam engines eventually declined in popularity as other power sources became available. Although there were more than 60,000 steam cars made in the United States between 1897 and 1927, the steam engine eventually gave way to the internal combustion engine as a power source for vehicles.

*Match each statement with the correct person A-D.*

|  |
| --- |
| A Thomas Savery |
| B Thomas Newcomen |
| C James Watt |
| D Charles A. Parsons |

**1)** His invention was the first to use moving parts.  

**2)** His invention allowed steam power to be converted into electric power.  

**3)** His invention was the single biggest step in development.  

**4)** His invention was a simple solution to an industrial problem.  

**5)** His invention was the first continuous power source.  

**6)** His invention first used a method people still use now.  

**7)** His invention allowed a much greater degree of control.  

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

|  |
| --- |
| The Miner's Friend used condensed steam to **(8)** ...................., which sucked water from mines. |
| https://www.ielts-exam.net/images/reading/a1.gif |
| Design improved: Newcomen **(9)** .................... using a piston and cylinder instead of an open boiler. |
| https://www.ielts-exam.net/images/reading/a1.gif |
| 1769: separating heating and cooling processes meant no **(10)** .................... between power strokes. |
| https://www.ielts-exam.net/images/reading/a1.gif |
| Further development: became easier to **(11)** .................... through the use of the flywheel. |
| https://www.ielts-exam.net/images/reading/a1.gif |
| Nineteenth century: steam power **(12)** .................... for use in various means of transport. |

**II Choose the best or most appropriate response (6p):**

1. The eyes, technically speaking, were sensitive presence (1)................., which functioned, not by (2) ..................... light, but by measuring temperature

а) Controls b) detectors c) lids d) plates

а) triggering b) seeing c) sensing d)setting off

1. As regards the touchpad, the designers 3)…………….. and invented a new system using a sensitive surface.
2. Reinvented the wheel b) revamped it c) went back to the drawing board

d) went from the grounds up

1. Under no 4) ………………….. should anyone enter the restricted area without permission.
2. conditions b) circumstances c) means d) time
3. 5)…………………….analysis – a term used to describe safety planning, where a given industrial operation is thought through carefully in advance, from a safety standpoint, in order to identify the potential dangers so that a safe system of work can be put in place
4. safety b) precautionary c) hazard d) dangerous
5. The 6) …………………….. turn due to the airflow generated by the wind.
6. turbines b) blades c) tower d) windfarms

**III Match the definitions below to the words (8)**

|  |
| --- |
| *fluctuate feasibility reading attenuation revamp contravene comply with breach needs analysis continuous broadcast tall order delay pick up continual coal aerial retrieve blip trigger build-up* |

finding out what the requirements are for a new project by looking at all the factors that are involved and how they will interact

act in accordance, meet specified standards

A gradual accumulation or increase, typically of something negative that leads to a problem.

An unexpected, minor, and typically temporary deviation from a general trend.

forming a sequence in which the same action or event is repeated frequently.

a task or job that is difficult to carry out

give new and improved form, structure, or appearance to.

the possibility of doing something

IV Put the words in brackets in the correct form: infinitive or gerund (5 pts)

|  |  |
| --- | --- |
|  |  |

1 I’m not an early bird but I’ve got used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (get up) at dawn.

2 Tim is looking forward to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (visit) his friend in Paris next summer.

3 The teacher refused \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (take part) in our outing.

4 For several moments I watched them \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (fight) one another in the gym but I left before they finished.

5 I regretted \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (not give) a chance to apologise for my misbehaviour.

**V Put the verbs in brackets into the correct form: I, II, III or Zero Conditional (6 pts):**

1. You \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (get) soaked to the skin unless you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (take) a raincoat with you.
2. Ann \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (break off) her relationship with George a long time ago if she \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (be) more mature.
3. The boss is mad with you. If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (be) you, I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (get down) to writing the financial report right now.

**VI Put the verbs in brackets into the correct future tense (5 pts):**

1. I \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (buy) the cigarettes from the corner shop when it opens.
2. I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (let) you know the second the builders finish decorating.
3. On Sunday at 8 o'clock I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (meet) my friend.
4. They \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (fly) to London on Friday evening at 8:15.
5. Wait! I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (drive) you to the station. (to drive)

**VII Match the word with the appropriate definition (4 pts):**

1. analogue a) a wave suitable for modulation by an information-bearing signal

2. source encoder b) the deterioration in quality, level or standard of performance

3. degradation c) a system in which data is represented as a continuously varying voltage

4. carrier wave d) a device which maps the source into a set of binary strings

**VIII Make two meaningful sentences using the words given (4p):**

1 from scratch, Achilles’ heel

2 With regard to, a tall order

………………………………………………………………………………………………………………………

………………………………………………………………………………………………………………………