GENERAL CERTIFICATE OF EDUCATION BOARD
Technical and Vocational Education Examination

ENGINEERING SCIENCE 1
5155

JUNE 2021 **INTERMEDIATE LEVEL**

Specialty	**All Industrial Specialties**
Centre No. & Name	
Candidate Identification No.	
Candidate Name	

Mobile phones are **NOT** allowed in the examination room.

5155 ENGINEERING SCIENCE 1: MULTIPLE CHOICE QUESTION PAPER

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you start answering the questions in this paper. Make sure you have a soft HB pencil and an eraser for this examination.

1. USE A SOFT HB PENCIL THROUGHOUT THE EXAMINATION.
2. DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Before the examination begins:

3. Check that this question booklet is headed "**Intermediate Level – 5155** ENGINEERING SCIENCE **1**.
4. Insert the information required in the spaces above.
5. Insert the information required in the spaces provided on the answer sheet using your HB pencil:

   Candidate Name, Exam Session, Subject Code and Candidate Identification Number.

   Take care that you do not erase or fold the answer sheet or make any marks on it other than those asked for in these instructions.

How to answer the questions in this examination:

6. Answer **ALL** the **50** questions in this Examination. All questions carry equal marks.
7. Each question has FOUR suggested answers: **A, B, C** and **D**. Decide which answer is correct. Find the number of the question on the Answer Sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen.

   For example, if **C** is your correct answer, mark **C** as shown below:

   [A] [B] [~~C~~] [D]

8. Mark only one answer for each question. If you mark more than one answer, you will score a zero for that question. If you change your mind about an answer, erase the first mark carefully, then mark your new answer.
9. Avoid spending too much time on any one question. If you find a question difficult, move on to the next question. You can come back to this question later.
10. Do all rough work in this booklet, using, where necessary, the blank spaces in the question booklet.
11. Texts, notes and pre-prepared materials of any kind are also NOT allowed in the examination room.
12. **At the end of the examination, the invigilator shall collect the answer sheet first and then the question booklet. DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

Turn Over

1. Which of the following laws expresses the idea of inertia?
   A The law of conservation of momentum.
   B Newton's first law of motion.
   C Newton's second law of motion.
   D Newton's third law of motion.

2. When palm oil is mixed with water and allowed, the oil settles on top of water because water is
   A denser.
   B colourless.
   C odourless.
   D less viscous.

3. A force which acts on a stretched string is called
   A tension.
   B upthrust.
   C friction.
   D weight.

4. The quantity with derived unit $kgms^{-2}$ is
   A work.
   B force.
   C momentum.
   D power.

5. An object of mass 5 kg falls from a platform of height 10 m. The velocity with which it strikes the ground as it falls is
   A 18.30 m/s.
   B 12.12 m/s.
   C 14.14 m/s.
   D 11.15 m/s.

6. A Newton meter reads 10 N when an object of mass(m) is freely hung on it in air. If the density of the object is 5 g/cm^3, calculate the volume of the object.
   A 100 cm^3
   B 500 cm^3
   C 50 cm^3
   D 200 cm^3

7. Determine the resultant of the two forces shown in figure 1 below.

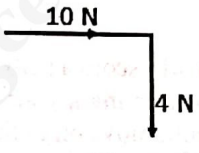

Figure 1

   A 14 N
   B 6 N
   C 10.8 N
   D 10 N

8. Figure 2 below shows how a cement mixer can be prevented from sinking into the earth.

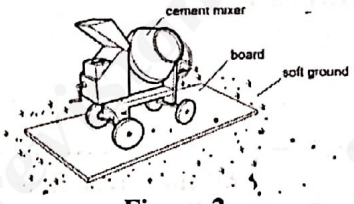

Figure 2

How does the large board prevents the mixer from sinking? The large board
   A increases the weight on the ground.
   B decreases the weight on the ground.
   C increases the pressure on the ground.
   D decreases the pressure on the ground.

9. Which of the following energy sources is non-renewable ?
   A Tidal
   B Wind
   C Solar
   D Coal

10. A mango tree converts
   A chemical energy to heat energy.
   B electrical energy to chemical energy.
   C chemical energy to light energy.
   D light energy to chemical energy.

11. One Kilowatt hour is equivalent to
   A $3.6x10^6$ J.
   B 3.6 J.
   C 3600 J.
   D 60000 J.

12. A pulley is used to raise 5 bags of cement of mass 50 kg each to a platform 15 m high. Determine the work done by the pulley.
   A 3750 J
   B 37500 J
   C 7500 J
   D 166.67 J

13. One end of a thread is fixed to a ceiling and the other end tied to an iron ball. The ball is then made to swing through point Q as shown in figure 3. At point Q, the ball has its

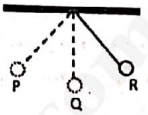

Figure 3

   A maximum potential energy.
   B maximum kinetic energy.
   C zero kinetic energy.
   D minimum kinetic energy.

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14. A material that regains its original shape and size after a distorting force has been removed is
A strong.
B plastic.
C elastic.
D tough.

15.

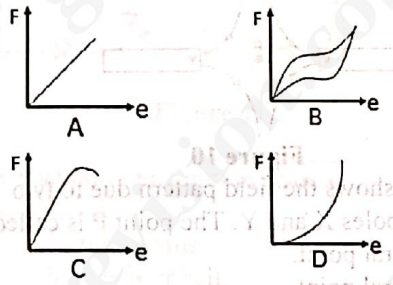


Figure 4

Which of the graphs in figure 4 best represents the force-extention graph for rubber ?

16. Plastics are generally very good engineering materials because they are
A heavy.
B non-biodegradable.
C resistant to corrosion.
D resistant to heat.

17. Which material is commonly used in making water pipes?
A Aluminium.
B Iron.
C Plastics.
D Rubber.

18. The primary colours are
A blue, green and red.
B blue, orange and red.
C orange , yellow and white.
D black, white and grey.

19.

Figure 5

White light passes through a prism as shown in figure 5 and it falls on a screen. The colours X and Y are respectively
A red and blue.
B violet and red.
C red and violet.
D blue and violet.

20 In order that a convex lens functions as a magnifying glass, the object must be placed
A between F and 2F.
B at 2F.
C between F and lens.
D at F.

21. The number of cycles made by a vibrating particle per second is the
A amplitude.
B frequency.
C speed.
D wavelength.

22. A radio transmitter sends out waves of wavelenght 3.0 m. If the velocity of the waves in air is 3.0×10^8 m/s, what is the frequency of transmision of the waves ?
A 1.0×10^8 Hz
B 1.0×10^{-8} Hz
C 1.0×10^9 Hz
D 9.0×10^8 Hz

23. Marine soldiers send out a distress signal which produces light and sound. A rescue team should respond to them immediately they see the light, instead of responding to the sound because
A light will enable them to see while sound will not.
B sound travels faster than light.
C light travels faster than sound.
D light carries more information than sound.

24. Figure 6 below is the circuit symbol for

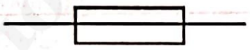


Figure 6

A resistor.
B battery.
C fuse.
D rheostat.

25. For a fuse to effectively protect an appliance, it should be connected on the
A main cable.
B live cable.
C neutral cable.
D earth cable.

26. What are the charge carriers in metallic conductors ?
A Holes
B Electrons
C Protons
D Ions

27. Doping substances that are used to produce p-type semi-conductors are elements of group
A 3.
B 5.
C 4.
D 8.

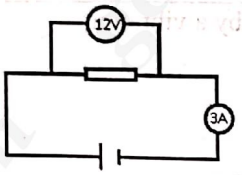
28.


Figure 7
With reference to figure 7, above, the resistance of the resistor is
A 4 Ω.
B 36 Ω.
C 9 Ω.
D 15 Ω.

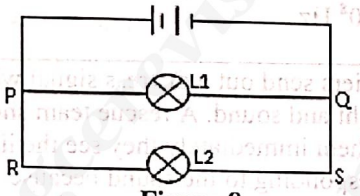
29.


Figure 8
Figure 8 shows two lamps L1 and L2 and it is observed that L1 does not light. There is a broken connection between
A S and P.
B P and R.
C P and Q.
D Q and R.

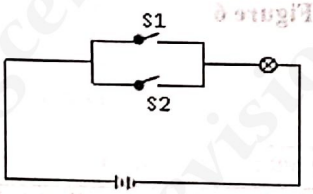
30.


Figure 9
Name the logic gate whose equivalent circuit is shown in figure 9.
A AND gate
B NOR gate
C NOT gate
D OR gate

31. Magnetic field lines
A attract each other when they move in the same direction.
B repel each other when they move in opposite directions.
C move from south pole to north pole.
D move from north pole to south pole.

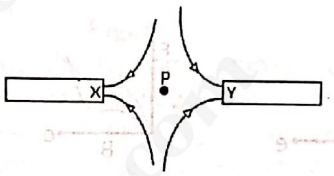
32.


Figure 10
Figure 10 shows the field pattern due to two magnetic poles X and Y. The point P is called
A central point.
B neutral point.
C magnetic point.
D contact point.

33. A force is always induced on a current-carrying conductor. Name an appliance that uses this principle of the induced force to function.
A Microphone.
B Inductor.
C Transformer.
D Loud speaker.

34. For a step down transformer
A N_s is greater than N_p.
B N_s is less than N_p.
C N_p is less than N_s.
D N_s is equal to N_p.

35. Generally, transformers become hot when in use because of
A eddy current only.
B hysteresis losses only.
C eddy currents and hysteresis losses.
D magnetic flux linkages.

36. Two semi-conducting elements are
A silicon and germanium.
B silicon and boron.
C phosphorus and germanium.
D boron and germanium.

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37. Which of the circuits in figure 11 contains a light emitting diode and a fuse?

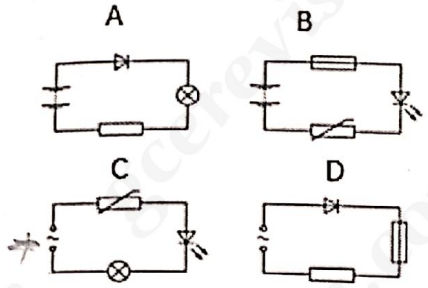

Figure 11

38. The standard temperature scale is
- A kelvin.
- B degree celsius.
- C degree farenheit.
- D degrees.

39. Mercury is preferred to water as a thermometric liquid because
- A mercury is denser than water.
- B mercury expands uniformly.
- C water has a high specific heat capacity.
- D water is a polar liquid.

40. When a man is sweating, he feels uncomfortable in very humid air because
- A the rate of evaporation is low.
- B the air is saturated.
- C there is no evaporation.
- D the air is less dense.

41. A burn from steam at 100 °C is more dangerous than a burn from water at same temperature. This is because
- A water is liquid while steam is vapour.
- B water has latent heat while steam does not.
- C steam is a good absorber of heat than water.
- D steam has more thermal energy than water.

42. The change of state of matter from liquid to solid is described as
- A melting.
- B freezing.
- C condensation.
- D evaporation.

43. During electrolysis positive ions move from
- A electrolyte to cathode.
- B electrolyte to anode.
- C cathode to electrolyte.
- D cathode to anode.

44. Which of the following is NOT an organic compound ?
- A Coal
- B Petroleum
- C Water
- D Sugar.

45. Isotopes of an element have different
- A proton number.
- B neutron number.
- C atomic number.
- D electron number.

46. Select a balanced equation from the following:
- A $Mg + O_2 \rightarrow MgO$
- B $2Mg + O_2 \rightarrow MgO$
- C $Mg + O_2 \rightarrow 2MgO$
- D $2Mg + O_2 \rightarrow 2MgO$

47. The relative molecular mass of C_2H_6 (ethane) is (c =12, H=1)
- A 18.
- B 30.
- C 24.
- D 32.

48. In order to increase the beauty and durability of a wedding ring, it can be coated with a more lustrous metal like gold in a process called
- A galvanizing.
- B alloying.
- C electroplating.
- D enameling.

49. What is likely to happen on earth if the ozone layer is destroyed ?
- A More clouds will reach the earth.
- B More radiations will reach the earth.
- C More gases will flow into the atmosphere.
- D There will be increase in rain fall.

50. Radioactive waste can safely be disposed by
- A burning it in very hot fire.
- B dumping it into a big river.
- C pouring it down the drain.
- D burying it deep in the ground.