**T.I. MATRICULATION HIGHER SECONDARY SCHOOL, AMBATTUR**
**HALF YEARLY EXAMINATION- DECEMBER 2018**

**SCORING KEY**

**PHYSICS**

Class:X PART A

***I.Choose the correct answer*** ***(6x1=6)***

1.The hindrance presented by material of conductor to the smooth passing of electric current is known as:
(**Resistance** , Conductance , Inductance , None of these)
2. If A and B are two objects with masses 10 kg and 42 kg respectively, then
(A has more inertia than B **, B has more inertia than A ,**
A and B have same inertia ,None of the two has inertia)
3.Screw Gauge is an instrument used to measure the dimensions of very small objects upto
(0.1 cm, 0.01 cm, 0.1 mm, **0.01 mm**)
4. Which of the following device works on electromagnetic induction?
(ammeter, voltmeter, **generator**, electric motor)
5.The amount of energy produced by the conversion of 1 kg of substance into energy is
( 1.6 x$10^{-18}$ J, 1 MeV, **9x$10^{16}$ J**, 3x$10^{8}$ J)
6.The direction of current in Fleming's right hand rule is represented by
(thumb, fore finger, **middle finger**, little finger)

PART B

***II Answer any SEVEN of the following.*** ***(7x2=14)***

7. What are the advantages of heating effect of current?

**toaster, iron box, heater or relevant examples** **2 marks**

8. Match the column A with column B

| A | B |
|---|---|
| 1.Resultant of the forces is zero | **e.balanced force** |
| 2.Newton's first law | **c.inertia** |
| 3.Newton's second law | **d.Definition of force** |
| 4.Newton's third law | **a.Law of conservation of momentum** |

**4x1/2= 2 marks**

9.Spot the error /mistake

a. The unit of G and g is $Nm^2/kg^3$ and $m/s^2$

The unit of G is **$Nm^2/kg^2$** and $m/s^2$ **1 mark**

b. A space station is a natural structure designed for human to live and work in earth space for a long time.
A space station is a **artificia**l structure designed for human to live and work in earth space for a **short** time **1 mark**

10.Calculate the required value:

A bullet of mass 15 g is horizontally fired with a velocity 100 m/s from a pistol of mass 2 kg. What is the recoil velocity of the pistol?

**$Mu_1 + mu_2 = mv_1 + mv_2$** **½ mark**

**$0 = 15 \times 10^{-3} \times 100 + 2 \times v_2$** **½mark**

**$v_2 = -0.75$ m/s** **½+1/2 marks**

11.In our homes, we receive supply of electric power through a main supply either supported through overhead electric poles or by underground cables.
(a)Name the three connecting wires of the cable which is used to supply power to a house and also mention its colour?

One of the wires in the supply,usually with red insulation, is called live wire. Another wire, with black insulation,is called neutral wire. In our country, the potential difference between the two are 220 V. Another wire in green insulation is called earth wire.
**1 mark**

(b)Which two of the three wires are at the same potential?
Live wire and neutral wire **1 mark**

12.Fill up the blanks:

(a)Unit for potential difference is **Volt** **1 mark**

(b)In $E=m c^2$, c represents **velocity of light** **1 mark**

13.Which uses more energy, a 250 W TV set in 1 h or a 1200 W toaster in 10 min?

Energy 1= Power x time= 250 x 1 =250 Wh or 0.250 Kwh **½ +1/2 mark**

Energy 2= 1200 x 10/60 =200 Wh= 0.200 KWh **½ mark**

TV uses more energy **½ mark**

14.An electric bulb draws a current of 0.2 A when the voltage is 220 volt. Calculate the amount of electric charge flowing through it in one hour.

Q=I x t **½ mark**

Q=0.2 x1x 3600 **½ mark**

Q=720 C **½+1/2 mark**

15. State Flemings left hand rule.

Stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular. If the forefinger points in the direction of magnetic field and the middle finger points in the direction of motion or the force acting on the conductor.

**2 marks**

16. How to increase the power of a electric motor.

(i) an electro magnet in place of a permanent magnet (ii) a large number of turns of the conducting wire in the current-carrying coil(iii) a soft iron core on which the coil is wound .

**2 mark**s

PART C

***III Answer any TWO of the following.*** ***(2X5=10)***

17. List out any five achievements of chandrayan

Chandrayaan operated for 312 days and achieved 95% of its planned objectives. The following are its achievements:

- The discovery of wide-spread presence of water molecules in lunar soil.
- Chandrayaan's Moon Mineralogy Mapper has confirmed that moon was once completely molten.
- European Space Agency payloadChandrayaan-1 imaging X-ray spectrometer (CIXS) detected more than two dozen weak solar flares during the mission.
- The terrain mapping camera on board Chandrayaan-1 has recorded images of the landing site of the US space-craft Apollo-15, Apollo-11.
- It has provided high-resolution spectral data on the mineralogy of the moon.
- Lunar Laser Ranging Instrument (LLRI) covered both the Lunar Poles and additional lunar region of interest.

• The X-ray signatures of aluminium, magnesium and silicon were picked up by the CIXS X-ray camera.

• The Bulgarian payload called Radiation Dose Monitor (RADOM) was activated on the very same day of its launch and worked till the mission ended.

• More than 40,000 images have been transmitted by Chandrayaan camera in 75 days.

• The Terrain Mapping Camera acquired images of peaks and craters. The moon consists mostly of craters.

• Chandrayaan beamed back its first images of the Earth in its entirety

. • Chandrayaan-1 has discovered large caves on the lunar surface that can act as human shelter on the moon

**Any five points** **(5x1=5 marks)**

18. Force is acting on a current carrying conductor placed in a magnetic field. Explain this with an experiment.

We know that an electric current flowing through a conductor produces a magnetic field. The field so produced exerts a force on a magnet placed in the vicinity of a conductor. French scientist Andre Marie Ampere suggested that the magnet must also exert an equal and opposite force on the current-carrying conductor.

The force due to a current-carrying conductor can be demonstrated through the activity Take a small aluminium rod AB of about 5 cm. Using two connecting wires suspend it horizontally from a stand • Place a horse-shoe magnet in such away that the rod lies between the two poles with the magnetic field directed upwards. For this put the North Pole of the magnet vertically below and South Pole vertically above the aluminium rod • Connect the aluminium rod in series with a battery,a key and a rheostat. • Now pass a current through the aluminium rod from end B to A. • it is observed that the rod is displaced towards the left. • Reverse the direction of current flowing through the rod and observe the direction of its displacement. It is now towards the right. •

The displacement of the rod in the above activity suggests that a force is exerted on the current-carrying aluminium rod when it is placed on a magnetic field. It also suggests that the direction of force is also reversed when the direction of current through the conductor is reversed. Now change the direction of the field to vertically downwards by interchanging the two poles of the magnet. It is once again observed that the direction of force acting on the current-carrying rod gets reversed. It shows that the direction of force on the conductor depends upon the direction of current and the direction of magnetic field. Experiments have shown that the displacement of the rod is maximum when the direction of current is at right angles to the direction of the magnetic field.

**2 mark+2 mark**

**{Explanation can be in their own words – need not stick on to exactly the same words}**

Diagram **1 mark**

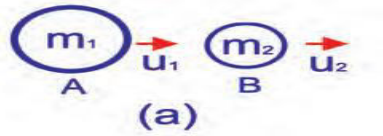
19. State and prove the law of conservation of momentum.

The law of conservation of momentum states that, in the absence of external unbalanced force, the total momentum of a system of objects remains unchanged **1 mark**

**Proof:**

Consider two objects (two balls) A and B of masses ‘m1’ and ‘m2’ travelling in the same direction along a straight line at different velocities ‘u1’ and ‘u2’ respectively. Fig.15.6(a). There are no other external unbalanced forces acting on them . Let u1 > u2 and the two balls collide with each other as shown in Fig. During collision which last for time ‘t’ , the ball A exerts a force F1 on ball B , and the ball B exerts a force F2 on ball A. Let v1 and v2 be the velocities of two balls A and B after collision respectively in the same direction as before collision. **1 mark**

**{Explanation can be in their own words – need not stick on to exactly the same words}**




(a)


(b)


**1 mark**

Newton’s second law of motion,

The force acting on B (action) F1 = mass of B X acceleration on B

$$F1 = \frac{m2\,(v2-u2)}{t} \quad \ldots\ldots (1)$$

The force acting on A (reaction) F2 = mass of A X acceleration on A

$$F2 = \frac{m1\,(v1-u1)}{t} \quad \ldots\ldots (2)$$

According to Newton’s third law of motion,

F1 = – F2

From equation (1) and (2)

$$\frac{m2\,(v2-u2)}{t} = \frac{-\,m1\,(v1-u1)}{t}$$

$m\ 2\,(v2 - u2) = -m1\,(v1-u1)$

$m2v2 - m2u2 = -m1v1 + m1u1a$

$m1v1 + m2v2 = m1u1 + m2u2a$

Therefore,

$m1u1 + m2u2 = m1v1 + m2v2$ **1+1 mark**

The total momentum before collision is equal to the total momentum after collision. The total momentum of two objects remain unchanged due to collision in the absence of external force.

20. The equivalent resistance of eight resistances in series is 48 Ω. What would be the equivalent resistance if they are connected in parallel?

$1/R_p = n/R$ **1 mark**

$R_p = R/n$ **mark**

$Rs = nR$ **1 mark**

$48 = 8xR$ $R=6$ **½ +1/2 mark**

$R_p = R/n$

$R_p = 6/8$

$= ¾\ \Omega$ **1 mark**