DOON ACADEMY OF DEFENCE (D.A.D.)

MNS-2020 (Physics Questions)

(Note : These questions are memory based. The actual question in exam may vary)

1. **The focal length of a convex mirror is 50 cm. What will be its Power ?** **[Shift 1]**
   <u>+2D</u>

   $$\text{Power} = \frac{1}{f(\text{in m})} = \frac{100}{f\,(\text{in cm})} = \frac{100}{+50} = +2D$$

2. **Impurities in semiconductor doping** **[Shift 1]**
   For <u>p-type semiconductor</u> , <u>trivalent impurity atoms</u> (group 13) are added with intrinsic semiconductor.
   For <u>n-type semiconductor</u> , <u>pentavalent impurity atoms</u> (group 15) are added with intrinsic semiconductor.

3. **Colour band of carbon resistor** **[Shift 1]**
   Every carbon resistor has 4 colour bands , which represents its resistance value.
   Band 1 & 2 : Significant Digit
   Band 3 : Decimal Multiplier (Power of 10)
   Band 4 : Tolerance (% Variation)

	Name	Significant Digit	Decimal Multiplier	Tolerance
B	**Black**	0	10^0	-
B	**Brown**	1	10^1	-
R	**Red**	2	10^2	-
O	**Orange**	3	10^3	-
Y	**Yellow**	4	10^4	-
G	**Green**	5	10^5	-
B	**Blue**	6	10^6	-
V	**Violet**	7	10^7	-
G	**Grey**	8	10^8	-
W	**White**	9	10^9	-
	Gold	-	10^{-1}	± 5%
	Silver	-	10^{-2}	± 10%
	No Colour	-	-	± 20%

4. **Find the coefficient of friction if normal force is 25N and friction force is 50N?** **[Shift 2]**

   f=μN
   μ=f/N = 50/25 = <u>2</u>

5. **What is the height of a building if a ball dropped from top takes 3s to reach bottom?** **[Shift 2]**

   $$s = ut + \frac{1}{2}at^2 = 0(t) + \frac{1}{2} \times 9.8 \times (3)^2 = 44.1\ m$$

6. **Majority charge carriers when intrinsic semiconductor doped with group 15 element** **[Shift 2]**

Group 15 elements are pentavalent.
So , Intrinsic Semiconductor + Group 15 Element = <u>n-type Semiconductor</u>

7. **Resistor has golden colour band. Find tolerance** **[Shift 2]**
<u>For Gold : Tolerance = ± 5%</u>
For Silver : Tolerance = ± 10%
For No colour : Tolerance = ± 20%

8. **Object moving in elliptical path, which is quantity remains constant** **[Shift 2]**
Only <u>angular momentum</u> remains constant , if no torque acts on object.
Other quantities like linear momentum , speed , velocity , acceleration , kinetic energy are keep changing.

9. **Time period of second's pendulum** **[Shift 2]**
<u>2 seconds</u>

10. **A ray of light used for optical transmission uses which phenomena** **[Shift 2]**
<u>Total Internal Reflection</u>
When light goes from a denser medium to a rarer medium , at an angle greater than critical angle , it reflects back into the denser medium. This is called total internal reflection.

11. **Direction of Magnetic field and current in long wire is** **[Shift 3]**
<u>Perpendicular to each other</u>
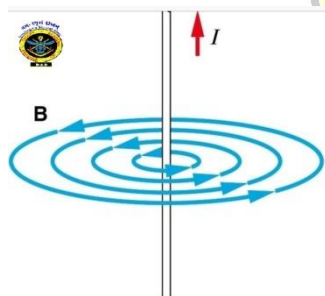
12. **Study of sound is called** **[Shift 3]**
<u>Acoustics</u>

13. **If the kinetic energy of an object is increased 4 times. What will be the increment of the momentum ?**

$$KE = \frac{p^2}{2m}$$
$$p = \sqrt{2m\,(KE)} \implies p \propto \sqrt{KE}$$
So , if kinetic energy become 4 times , momentum become <u>twice</u> of its initial value.

14. **Collision of molecules occurs in**
(a) Convection **(b)Radiation** **(c) Conduction**
<u>Convection</u>
They all three are mode of transfer of heat.
Conduction : Heat transfer generally in solids , by thermal vibration of molecules at their position , without any actual transfer of molecules.

Convection : Heat transfer generally in fluids , by thermal motion of molecules, along with actual transfer of molecules.

Radiation : Heat transfer generally in vacuum , in form of electromagnetic waves.

15. **Parsec is unit of**
    Length
    1 parsec = radius of circle in which an arc of 1 AU (Astronomical Unit) subtends an angle of 1" at the centre
    1 parsec = 3.26 light year = 2.06×10^5 AU = 3.08×10^{16} m

16. **Iron heating element made up of**
    Nichrome
    Nichrome is an alloy of Nickel and Chromium . It is used as heating filament in many appliances.

17. **Work done by which force is zero on a body?**
    Centripetal Force
    Centripetal force is always perpendicular to instantaneous velocity of body , while revolving around a point. So work done is zero.

18. **What opposes change in magnetic flux?**
    Induced EMF
    According to faraday's and lenz's law , whenever there is a change in magnetic flux linked with a coil/loop , an induced emf is produced in coil/loop , and its direction (polarity) is such that it always opposes it cause of production i.e. change in magnetic flux.