

**DIPLOMA IN MANAGEMENT IN INDUSTRIAL
SAFETY, HEALTH & ENVIRONMENT DM
(ISHE)**

00824

**Term-End Examination
June, 2010**

BIS-002 : BASIC MECHANICAL ENGINEERING

Time : 3 hours

Maximum Marks : 70

Note : Question No. 1 and 2 are compulsory. Attempt five questions in all. All questions carry equal marks.

1. Define *any seven* of the following : **7x2=14**
- (a) Conservation of momentum
 - (b) Newton's second law of motion
 - (c) Hookes law
 - (d) Scalar and vector quantity
 - (e) Work
 - (f) Centripetal force
 - (g) Pascal's law
 - (h) Viscosity
 - (i) Crystalline solids
 - (j) Ductile material

2. Fill in the blanks (*any seven*) : 7x2=14

- (a) Dimensions of impulse in MLT system is _____.
- (b) One Newton is the force which produces an acceleration of _____ in a mass of _____.
- (c) If two equal forces of magnitude 'F' act at an angle of θ , their resultant is _____.
- (d) Two couples acting in a plane may be in equilibrium only when their moments are _____ in magnitude and are _____ in direction.
- (e) The coefficient of static friction is always _____ coefficient of dynamic friction.
- (f) Frictional force acts in _____ direction to the surfaces in contact and _____ to the direction of motion.
- (g) The ratio of the distance covered to the displacement covered by a body along a semicircular of radius r is _____.
- (h) A metallic wire of resistance 40Ω is stretched to twice its length. Its new resistance would be equal to _____.
- (i) Three resistance each of 4Ω are connected to form a triangle. The resistance between any two terminals will be equal to _____.
- (j) SI unit of self-induction is _____.

3. (a) Calculate the cost of operating a heater of 500 W for 20 hours at the rate of Rs. 1.75 per unit. 4+5+5
- (b) A block of mass 0.8 kg is dragged along a level surface by a hanging block of mass 0.2 kg as shown in figure 1. Calculate the tension in the string and the acceleration of the system.

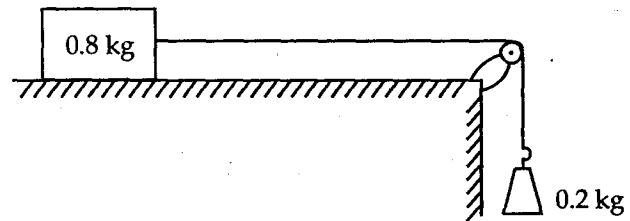


Figure - 1

- (c) The following circuit diagram as shown in figure 2, shows the combination of three resistors R_1 , R_2 and R_3 .

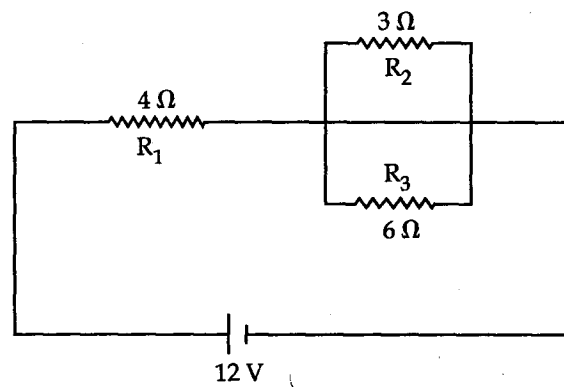
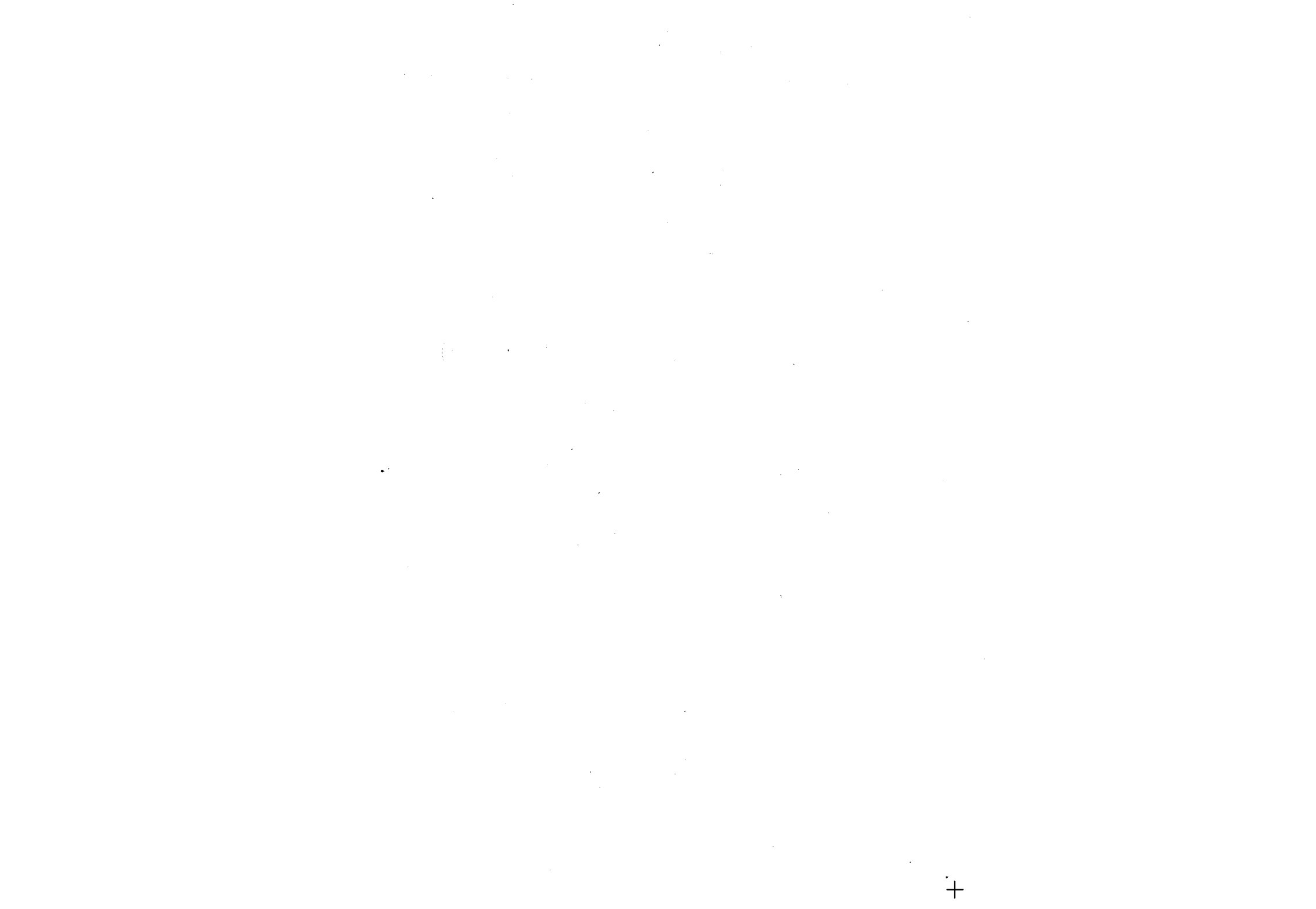


Figure - 2



- Find (i) total resistance of the circuit.
(ii) total current flowing in the circuit.
(iii) the potential difference across R_1

4. (a) In the network diagram as shown in figure 3, the current flowing across 5Ω resistor is 1 amp. 4+5+5

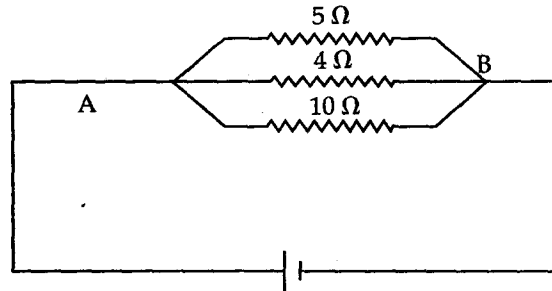


Figure - 3

Find the current flowing through the other two resistors.

- (b) What do you understand by the resistivity of a substance? State its SI unit.
- (c) A car has initial velocity of 72 km/hr . It is accelerated at 2 ms^{-2} . Calculate the final velocity and the distance covered after 3 seconds.
5. (a) Define coefficient of static friction and angle of friction. Show that $\mu = \tan \alpha$, where symbols have their usual meanings. 4+5+5

- (b) What are elastic and inelastic collisions ?
Give examples.
- (c) Find the work done, if a weight of 25 kg is lifted through a vertical height of 2 m from the ground and also if it is raised to same place by pushing up an inclined plane making an angle of 30° with the ground. Neglect friction.
6. (a) What is meant by a geostationary satellite ?
- (b) Distinguish between laminar and turbulent flow. **4+4+6**
- (c) A pump on the ground floor of a building can pump up water to fill a tank of volume 30 m^3 in 15 minutes. If the tank is 40 m above the ground and the efficiency of the pump is 30%, how much electricity power is consumed by the pump ?
7. (a) What is Reynold's number ? On what factors does it depend ? **4+5+5**
- (b) Why do clothes dry up quickly on a dry day in comparison to that on a rainy day ?
- (c) Define the term lubricant and describe the functions of lubricants.
8. What is corrosion ? Explain the factors responsible for corrosion. How it can be prevented ? **14**
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