



3.  $J\ddot{x} + f_0 + f(x) = E \sin \omega t$  च्या नमुनेचे  $J\ddot{x} + f_0 = kE \sin \omega t$  :-  
 (+)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  जेथे  $\ddot{x}_0 = \frac{f_0}{J}$  आणि  $\ddot{x}_1 = \frac{E}{J} \sin \omega t$  आहे.  $\ddot{x}_0$  आणि  $\ddot{x}_1$  यांचे  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (म्ह)  $\ddot{x}_0$  आणि  $\ddot{x}_1$  यांचे  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (E)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (b) Damping  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  $\ddot{x}_0$  आणि  $\ddot{x}_1$  यांचे  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.

4.  $J\ddot{x} + f_0 = kE \sin \omega t$  (E) च्या नमुनेचे  $J\ddot{x} + f_0 = kE \sin \omega t$  :-  
 (+)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  जेथे  $\ddot{x}_0 = \frac{f_0}{J}$  आणि  $\ddot{x}_1 = \frac{E}{J} \sin \omega t$  आहे.  $\ddot{x}_0$  आणि  $\ddot{x}_1$  यांचे  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (म्ह)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (E)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (b)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.

5.  $J\ddot{x} + f_0 = kE \sin \omega t$  (E) च्या नमुनेचे  $J\ddot{x} + f_0 = kE \sin \omega t$  :-  
 (+)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  जेथे  $\ddot{x}_0 = \frac{f_0}{J}$  आणि  $\ddot{x}_1 = \frac{E}{J} \sin \omega t$  आहे.  $\ddot{x}_0$  आणि  $\ddot{x}_1$  यांचे  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (म्ह)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (E)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (b)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.

6.  $J\ddot{x} + f_0 + f(x) = E \sin \omega t$  च्या नमुनेचे  $J\ddot{x} + f_0 = kE \sin \omega t$  :-  
 (+)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  जेथे  $\ddot{x}_0 = \frac{f_0}{J}$  आणि  $\ddot{x}_1 = \frac{E}{J} \sin \omega t$  आहे.  $\ddot{x}_0$  आणि  $\ddot{x}_1$  यांचे  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (म्ह)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (E)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.  
 (b)  $\ddot{x} = \ddot{x}_0 + \ddot{x}_1$  आहे.

**BASIC ELECTRICAL, ELECTRONIC AND INSTRUMENTATION  
(THEORY-III)**

Marks

1. (a) Fill in the blanks (any *five*) :— 5
- (i) CT is used for measuring ..... .
- (ii) ..... is secondary cell.
- (iii) The time taken by an alternating quantity to complete one cycle is known as ..... .
- (iv) One metric HP = ..... Watts.
- (v) ..... type of motor is used in portable drilling machine.
- (vi) Moving Iron volt meter reads ..... value.
- (b) State the long forms (any *five*) :— 5
- (i) MI                                      (ii) LAB                                      (iii) PMMC
- (iv) CT                                      (v) KWH                                      (vi) VT.
- (c) Match the following pairs :— 5
- | ‘A’ Group         | ‘B’ Group           |
|-------------------|---------------------|
| (i) Ammeter       | (a) Null deflection |
| (ii) Voltmeter    | (b) Resistance      |
| (iii) Ohmmeter    | (c) Voltage         |
| (iv) Galvanometer | (d) Power           |
| (v) Wattmeter     | (e) Current.        |
- (d) State *true* or *false* (any *five*) :— 5
- (i) The household energy meter is recording instrument.
- (ii) In majority of instruments, damping is provided by eddy currents.
- (iii) An ammeter is a secondary instrument.
- (iv) The function of shunt in an ammeter is to be bypass the current.
- (v) The multiplier and the meter-coil in a voltmeter are in shunt.
- (vi) A moving iron instrument can be used for both D.C. and A.C.
2. Attempt any *two* of the following :— 16
- (a) State the Kirchhoff's laws and also write their applications.
- (b) With a neat diagram explain the construction and working of Electrodynamometer type instruments.
- (c) Give the comparison between spring control and gravity control.
- (d) Distinguish between ammeter, voltmeter and ohmmeter.

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**Marks**

3. Attempt any *two* of the following :— 16
- (a) Enlist the different types of solder fluxes and also write their proper uses.
  - (b) Explain with the diagram the operation of a Wheat stone bridge.
  - (c) Differentiate between analog and digital instruments.
  - (d) Explain the concept of damping. State types of damping and damping torque of metal disc.
4. Give brief answer of any *two* of the following :— 16
- (a) State principle of electrolysis and explain laws of electrolysis.
  - (b) Compare Attraction type and repulsion type instrument.
  - (c) Draw the circuit for basic DC ammeter. Derive equation for shunt resistor.
  - (d) Mention the maintenance procedure for electrical accessories and hand tool.
5. Write short notes on (any *four*) :— 16
- (a) Concept of series, parallel and mixed circuit
  - (b) Application of electromagnetic induction
  - (c) Absolute and secondary instruments.
  - (d) DC motor—construction and types.
6. Attempt any *two* of the following :— 16
- (a) Enlist the different types of cells and batteries, also write the common defects of them with remedies.
  - (b) Give the classification of transformer. Write mathematical terms and formulas used in transformer.
  - (c) Draw the letters, sign and symbol used in electrical technology.
  - (d) Explain the construction and principle of operation of single phase induction motor.
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