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Lockdown Period
Open Practice Test Series
(Also useful for ESE & Other Exams)

EE : ELECTRICAL ENGINEERING
TEST No. - 09 | Electrical & Electronics measurements

Read the following instructions carefully

1. This question paper contains 33 MCQ's & NAQ's. Bifurcation of the questions are given below:

Subjectwise Test Pattern					
Questions	**Question Type**	**No. of Questions**	**Marks**	**Total Marks**	**Negative Marking**
1 to 9	Multiple Choice Ques.	9	1	9	0.33
10 to 16	Numerical Answer Type Ques.	7	1	7	None
17 to 25	Multiple Choice Ques.	9	2	18	0.66
26 to 33	Numerical Answer Type Ques.	8	2	16	None
Total Questions : 33		**Total Marks : 50**		**Total Duration : 90 min**	

2. Choose the closest numerical answer among the choices given.

Multiple Choice Questions : Q.1 to Q.9 carry 1 mark each

Q.1 The power is measured in a resistor by passing current through it. The ammeter measures $I = (5 \pm 4\%)$ A across the resistance of $R = (10 \pm 2\%)\ \Omega$. The power consumed by the resistor and its limiting error will be

(a) 250 ± 8% (b) 250 ± 10%
(c) 50 ± 10% (d) 50 ± 8%

1. (b)

$$P = I^2R = 5^2 \times 10 = 250 \text{ Watt}$$
$$\varepsilon_p = \pm(2\varepsilon_I + \varepsilon_R)$$
$$= \pm(2 \times 4 + 2) = \pm 10\%$$

Q.2 The type of the damping which is used in moving iron type instruments is

(a) Air friction damping (b) fluid friction damping
(c) eddy current damping (d) None of these

2. (a)

Q.3 The material used for making spring is usually made of

(a) Copper (b) Nichrome
(c) Phosphor bronze (d) Constantan

3. (c)

Q.4 Two meters X and Y requires 10 mA and 15 mA respectively to give full scale deflection, then

(a) Sensitivity can not be judged with the given information
(b) Both are equally sensitive
(c) X is more sensitive
(d) Y is more sensitive

4. (c)

$$\text{Sensitivity} = \frac{1}{I_{fsd}}$$
$$\therefore \quad S_X > S_y$$

Q.5 A (0-10) mA DC ammeter with internal resistance of 1000 ohm is used to design a dc voltmeter with full scale voltage of 10 V. The full scale range of this voltmeter can be extended to 50 V by connecting an external resistance of

(a) 4000 ohm (b) 4900 ohm
(c) 250 ohm (d) 3000 ohm

5. (a)

$$R_s = (m-1)\, R_i \qquad (R_i \rightarrow \text{internal resistance of ammeter})$$
$$= (5-1) \times 1000 = 4000 \text{ ohm}$$

Q.6 The induction type energy meter can run fast by

(a) Changing the load lagging to leading
(b) Changing the load from leading to lagging
(c) Placing the breaking magnet away from the centre of the disc
(d) Placing the breaking magnet closer to the centre of the disc

6. (c)

$$\text{Speed} \propto \frac{1}{\text{distance of breaking magnet from centre of disc}}$$

Q.7 A voltmeter reading 80 V on its 100 V range and an ammeter reading 80 mA on its 150 mA range, are used to determine the power dissipated in a resistor. Both these instruments are guaranteed to be accurate within ±2%, at full scale deflection. The limiting error in the measurement of the power dissipation is

(a) 3.25% (b) 4.25%
(c) 5.25% (d) 6.25%

7. (d)

$$\text{The limiting error to 80 V} = \frac{0.02\times 100}{80}\times 100 = 2.5\%$$

$$\text{The limiting error at 80 mA} = \frac{0.02\times 150}{80}\times 100 = 3.75\%$$

The limiting error for power calculation

$$= 2.5\% + 3.75\% = 6.25\%$$

Q.8 A set of independent current measurement taken by four observers was recorded as: 115.02 mA, 115.11 mA, 115.08 mA and 115.04 mA. The average range of error will be

(a) 0.045 mA (b) 0.04 mA
(c) 0.0425 mA (d) 0.5 mA

8. (a)

Average value of current

$$I_{av} = \frac{115.02+115.11+115.08+115.04}{4}$$

$$= 115.0625 \text{ mA}$$

maximum and minimum readings are

$$I_{max} = 115.11 \text{ mA}, I_{min} = 115.02 \text{ mA}$$

$$\text{Average range of error} = \pm\frac{(I_{max}-I_{avg})+(I_{avg}-I_{min})}{2}$$

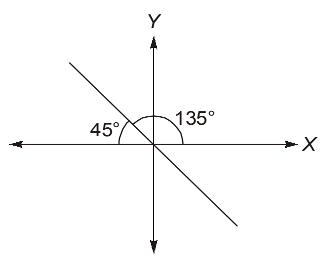
$$= \pm\frac{0.0475+0.0425}{2}\text{mA}$$

$$= \pm 0.045 \text{ mA}$$

Q.9 The lissajous pattern observed on the screen of a CRO is a straight line inclined at an angle of 45° with negative x-axis. If the voltage applied to the plate-X is $V(t) = 2 \sin \omega t$ V, then the voltage applied to the plate-Y will be

(a) $2 \sin \omega t$ V (b) $2 \sin (\omega t + 45)$ V
(c) $-2 \sin \omega t$ V (d) $2 \sin (\omega t - 45)$ V

9. (c)



It means voltages are 180° in phase.

$$\therefore \quad V_y = 2 \sin (\omega t + 180°)$$

$$V_y = -2 \sin \omega t$$

Numerical Answer Type Questions : Q. 10 to Q. 16 carry 1 mark each

Q.10 There is a circuit consisting of two parallel branches. The current in one branch is I_1 = (200 ± 5) A and in other is I_2 = (100 ± 10) A. The value of (A – B) if total current (I_1 + I_2) is ($A \pm B$) Amp (A, B > 0) will be ________ Ampere. (Consider the errors as standard deviation)

10. 288.82 (288.00 to 289.00)

$$I = I_1 + I_2$$

$$\text{Std deviation of } I = \sqrt{\left(\frac{\partial I}{\partial I_1}\right)^2 \sigma_1^2 + \left(\frac{\partial I}{\partial I_2}\right)^2 \sigma_2^2} \qquad \left(\text{as } \frac{\partial I}{\partial I_1} = \frac{\partial I}{\partial I_2} = 1\right)$$

$$= \sqrt{(5)^2 + (10)^2} = \sqrt{125} = 11.18 \text{ Amp}$$

$$I = 300 \pm 11.18 \text{ Amp}$$

$$A - B = 288.82 \text{ Amp}$$

Q.11 A PMMC instrument has a coil of dimensions 15 mm × 12 mm. The net flux density in the air gap is 1.8×10^{-3} Wb/m² and the spring constant is 0.14×10^{-6} Nm/rad. The number of turns required to produce an angular deflection of 90° when a current of 10 mA is flowing through the coil will be ________

11. 67.90 (67.80 to 68.10)

$$T_d = \text{BINA} = K\theta$$

$$\Rightarrow \quad N = \frac{K\theta}{\text{BIA}} = \frac{0.14 \times 10^{-6} \times \pi/2}{1.8 \times 10^{-3} \times 10 \times 10^{-3} \times 15 \times 12 \times 10^{-6}}$$

$$= 67.90$$

Q.12 A PMMC meter rated at 20 μA is used in a rectifier type of instrument which employs a half wave rectifier circuit. The sensitivity on sinusoidal ac is ________ kΩ/V.

12. 22.50 (22.00 to 23.00)

$$I_{fs} = 20\,\mu\text{A}$$

$$S_{dc} = \frac{1}{I_{fs}} = \frac{1}{20} \times 10^6\,\text{k}\Omega/\text{v}$$

$$S_{ac} = 0.45\, S_{dc}$$

$$= \frac{0.45 \times 10^6}{20}\,\Omega/\text{v} = \frac{450 \times 10^3\,\Omega/\text{v}}{20}$$

$$= 22.5 \text{ k}\Omega/\text{V}$$

Q.13 If distance between deflecting plates is 5 mm, anode accelerating voltage is 100 volt, length of screen from centre of the deflecting plates is 50 mm and length of the deflecting plate is 10 mm, then the value of deflection sensitivity will be ________ mm/volt.

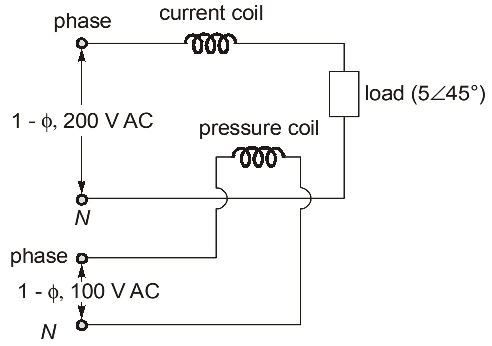
13. 0.5 (0.45 to 0.55)

$$\text{Deflection sensitivity} = \frac{Ll_d}{2dE_a}$$

$$= \frac{(50 \times 10^{-3}) \times (10 \times 10^{-3})}{2 \times 5 \times 10^{-3} \times 100} = \frac{1}{2}\text{ mm / volt}$$

$$= 0.5 \text{ mm/volt}$$

Q.14 The wattmeter reading of the diagram given below will be ________ W.



14. 2828.42 (2828 to 2829)

$$I_{CC} = \frac{200}{5\angle 45^\circ} = 40\angle -45^\circ$$

$$V_{CC} = 100\angle 0^\circ$$

$$P = \frac{100 \times 40}{\sqrt{2}} = 2828.42 \text{ Watt}$$

Q.15 A sample slide wire is used for measurement of current in a circuit. The voltage drop across a standard resistor of 1 ohm is balanced at 200 cm. If the standard cell emf of 2 V is balanced at 150 cm, then the magnitude of current is ________ Amp.

15. 2.67 (2.50 to 2.80)

$$\text{Voltage drop per unit length} = \frac{2}{150} \text{ V/cm}$$

$$\text{Voltage drop across 200 cm length} = \frac{2}{150} \times 200 = \frac{8}{3} \text{ volt}$$

$$\text{Current through resistor} = \frac{V}{R} = \frac{8/3}{1} = 2.67 \text{ Amp}$$

Q.16 A moving iron voltmeter and PMMC voltmeter is connected across the voltage source whose instantaneous value is $V(t) = -2 + 8\sin(\omega t + 30^\circ) + 6\sin(2\omega t + 60^\circ)$ V. The sum of readings of MI and PMMC voltmeters is ________ V.

16. 5.34 (5.30 to 5.40)

$$\text{Moving iron reading} = \sqrt{(2)^2 + \left(\frac{8}{\sqrt{2}}\right)^2 + \left(\frac{6}{\sqrt{2}}\right)^2} = \sqrt{54} \text{ V}$$

$$\text{PMMC reading} = -2 \text{ V}$$

$$\text{Sum} = \sqrt{54} - 2$$

$$= 5.34 \text{ Volt}$$

Multiple Choice Questions : Q.17 to Q.25 carry 2 marks each

Q.17 The law of deflection of a moving iron ammeter is given by $I = 4\theta^n$ ampere where θ is the deflection in radian and n is a positive constant ($n < 1$). The self inductance when the meter current is zero is 10 mH. The spring constant is 0.16 N-m/rad. The expression for self inductance of the meter as a function of θ and n is given by:

(a) $\left[\frac{1.10}{n-1}\theta^{(1-n)} + 0.01\right]H$

(b) $\left[\frac{1.01}{(1-n)}\theta^{(2-2n)} + 0.01\right]H$

(c) $\left[\frac{1}{(1-n)}\theta^{(2-2n)} + 0.01\right]H$

(d) $\left[\frac{1.10}{(2n-2)}\theta^{(1-n)} + 0.01\right]H$

17. (b)

$$\theta = \frac{1}{2}\frac{I^2}{K}\frac{dL}{d\theta}$$

$$\Rightarrow \quad \frac{dL}{d\theta} = \frac{2K\theta}{I^2}$$

$$\Rightarrow \quad \frac{dL}{d\theta} = \frac{1}{8}K\theta^{(1-2n)}$$

$$\Rightarrow \quad L = \frac{K\theta^{(2-2n)}}{8(2-2n)} + P = \frac{K\theta^{(2-2n)}}{16(1-n)} + P$$

$$L = 10 \text{ mH at } I = 0,$$

as $\quad \theta = 0$ at $I = 0$,

So, $\quad P = L = 0.01$ H

thus, $$L = \left[\frac{0.01}{1-n}\theta^{(2-2n)} + 0.01\right]H$$

Q.18 The power flowing in a 3-ϕ, 3 wire balanced load system is measured by the two wattmeter method. The reading of wattmeter A is 500 watts and wattmeter B is –100 watts.The power factor of the system is

(a) 0.866 (b) 0.707

(c) 0.567 (d) 0.359

18. (d)

Total power in the circuit

$$P = W_1 + W_2 = 500 + (-100) = 400 \text{ W}$$

Power factor of the circuit,

$$\cos\phi = \cos\left[\tan^{-1}\left\{\left(\frac{W_1 - W_2}{W_1 + W_2}\right).\sqrt{3}\right\}\right]$$

$$= \cos\left[\tan^{-1}\left\{\left[\frac{0.5-(-0.1)}{0.5+(-0.1)}\right].\sqrt{3}\right\}\right]$$

$$= \cos\left[\tan^{-1}(1.5\times\sqrt{3})\right] = 0.359 \text{ lagging.}$$

Q.19 A rectifier type of instrument uses a basic PMMC movement of 50 μA and a resistance of 15 kΩ. It employs a full wave rectifier circuit with forward resistance of each diode being 1 kΩ. The reverse resistance is infinite. The range of the instrument is (0 – 30 V) ac sinusoidal. The value of series multiplier used will have resistance of

(a) 523 Ω (b) 177 kΩ
(c) 523 kΩ (d) 524 kΩ

19. (c)

$$S_{dc} = \frac{1}{50 \times 10^{-6}} = 20000\ \Omega/\text{V}$$

$$S_{ac} = 0.9\ S_{dc} = 18000\ \Omega/\text{V}$$

Total resistance of circuit $= 18\ \text{k}\Omega \times 30 = 540\text{k}\Omega$

Resistance of multiplier is, $R_s = S_{ac}V - R_m - 2\ Rd$

$$= 540 - 15 - (2 \times 1)$$

$$= 523\ \text{k}\Omega$$

Q.20 An energy meter rated as 5 A, 230 V makes 500 revolutions per kWh. In a test at full load unity power factor, it makes 5 revolutions in 30 seconds, then

(a) the meter runs faster and error is 4.16%.
(b) the meter runs faster and error is 4.35%.
(c) the meter runs slower and error is 4.16%.
(d) the meter runs slower and error is 4.35%.

20. (b)

Energy consumed in 30 seconds,

$$E = \frac{230 \times 5 \times 30}{3600 \times 1000} = 0.00958\ \text{kWh}$$

The meter constant is 500 rev/kWh, so number of revolutions it should make is

$$N_1 = 500 \times 0.00958 = 4.7916$$

But it is making 5 revolutions

So, $N_2 = 5$

$\because\ N_2 > N_1 \Rightarrow$ meter is running fast

$$\%\ \text{error} = \frac{N_2 - N_1}{N_1} \times 100 = \frac{5 - 4.7916}{4.7916} \times 100$$

$$= 4.35\%\ (\text{fast})$$

Q.21 A dynamometer type of wattmeter is rated at 10 A and 100 V with full scale reading of 1000 watt. The inductance of the voltage circuit is 5 mH and its resistance is 3000 ohm. The error due to pressure coil inductance at rated *VA* with zero power factor load at 50 Hz will be

(a) 0.523 Watt (b) 523 Watt
(c) 1.046 Watt (d) 0.261 Watt

21. (a)

$$\tan\beta = \frac{\omega L}{R}$$

$$= \frac{2\pi \times 50 \times 5 \times 10^{-3}}{3000} = 0.000523\ \text{rad}$$

Power factor of load $= \cos\phi = 0,$

So, $\sin\phi = 1$

$$\text{error} = VI\sin\phi\tan\beta$$
$$= 100 \times 10 \times 1 \times 0.000523$$
$$= 0.523 \text{ Watt}$$

Q.22 A thermocouple instrument reads 10 A at full scale. The current at which it reads 1/3 rd of its full scale is

(a) 3.33 A
(b) 5 A
(c) 6.66 A
(d) 5.77 A

22. (d)

The deflection of thermocouple instruments follows square law response.

So, $$\frac{\theta_{\text{full scale}}}{\theta_{\text{one third of full scale}}} = \left(\frac{I_{fsd}}{I_{required}}\right)^2$$

$$\Rightarrow \quad \frac{1}{1/3} = \left(\frac{10}{I_r}\right)^2$$

$$\Rightarrow \quad I_r = 5.77 \text{ A}$$

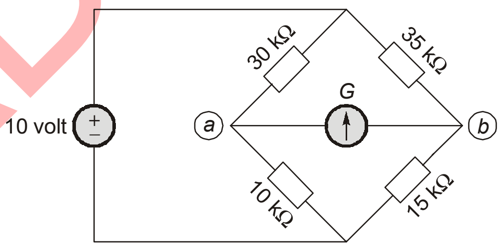
Q.23 The wattmeter commonly used for power measurement at commercial frequencies is of the X-type. This meter consists of two coil systems, the fixed system being the Y-coil and moving system being the Z-coil. Here, X, Y and Z respectively stands for

(a) dynamometer, voltage and current
(b) dynamometer, current and voltage
(c) induction meter, voltage and current
(d) induction meter, current and voltage

23. (b)

In dynamometer type wattmeter, the fixed coil is current coil and moving coil is voltage coil or pressure coil.

Q.24 In the given circuit, the current through the galvanometer and voltage between terminal (a) and (b) will be



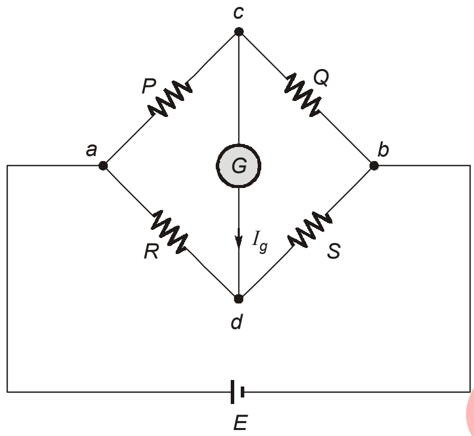
(a) 0.027 mA, –0.5 volt
(b) 0.027 mA, + 0.5 volt
(c) 0.054 mA, –1 volt
(d) 0.054 mA, +1 volt

24. (a)

$$V_{ab} = \left[\frac{10}{40} - \frac{15}{50}\right] \times 10$$
$$= 2.5 - 3 = -0.5 \text{ volt}$$
$$R_{ab} = (30 \,||\, 10) + (35 \,||\, 15)$$
$$= \frac{300}{40} + \frac{35 \times 15}{50} = 18 \text{ k}\Omega$$
$$I_g = \frac{0.5}{18} = 0.027 \text{ mA}$$

Q.25 A Wheatstone bridge is shown in figure below.

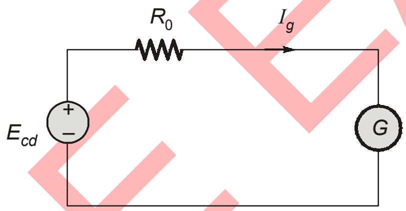
If P = 2 kΩ, R = 2 kΩ, S = 5 kΩ, G = 100 Ω, E_{cd} = 24 mV and galvanometer current I_g = 13.6 μA, the value of Q is



(a) 0.2688 kΩ
(b) 0.2466 kΩ
(c) 0.2966 kΩ
(d) 0.231 kΩ

25. (a)

The Thevenin's equivalent circuit is



Here, R_0 = Resistance of circuit looking into terminals d and c with terminals a and b short circuited.

$$\therefore \quad R_0 = \frac{R \cdot S}{R+S} + \frac{P \cdot Q}{P+Q} = \frac{2\times 5}{2+5} + \frac{2\times Q}{2+Q} = 1.428 + \frac{2Q}{2+Q}$$

Now, $$R_0 + G = \frac{24\times 10^{-3}}{13.6\times 10^{-6}}$$
$$= 1.765 \text{ k}\Omega = 1765\ \Omega$$

So, $$R_0 = 1765 - 100 = 1665\ \Omega = 1.665 \text{ k}\Omega$$

Now, $$1.428 + \frac{2Q}{2+Q} = 1.665$$

$$\Rightarrow \quad \frac{2Q}{2+Q} = 0.237$$

$$\Rightarrow \quad Q = 0.2688 \text{ k}\Omega$$

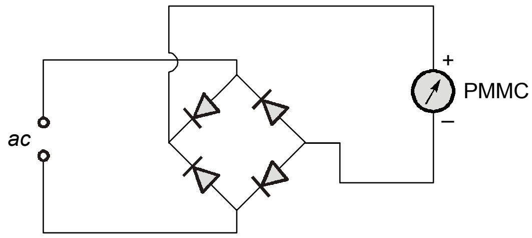
Numerical Answer Type Questions : Q. 26 to Q. 33 carry 2 marks each

Q.26 A conventional rectifier type ac voltmeter (generally has a full-wave bridge circuit with a PMMC meter calibrated in rms values) is used to measure a voltage given by

$v(t) = V_0 + 10 \sin 314t$ volts (10 sin 314 t is sinusoidal ac voltage)

_______ volt will be the reading of the meter for V_0 = 10 volts (assume no diode drop and neglecting cut-in voltage).

26. 18.166 (17.00 to 19.00)



Input voltage, $V(t) = V_0 + 10 \sin 314t$ volts.

For dc, output voltage = 10 volts.

For 10 sin 314 t,
$$V_{avg} = \frac{2V_m}{\pi} = \frac{2\times 10}{\pi} = 6.366 \text{ volts}$$

$\therefore$ V_{rms} = Form factor $\times V_{avg}$

or, $V_{rms} = 1.11 \times V_{avg} = 1.11 \times 16.366 \text{ V} = 18.166 \text{ V}$

Hence, meter reading = 18.166 Volts.

Q.27 In a loss of charge method, the insulation resistance is $K \times 10^4$ MΩ and the capacitance is 100 pF. The voltage falls from 100 V to 50 volt in 10 seconds. The value of K will be ________

27. 14.42 (14.30 to 14.50)

$$R = \frac{0.4343t}{C\log(V/V_c)} = \frac{0.4343\times 10}{100\times 10^{-12}\log 2}$$

$$= 14.42 \times 10^4 \text{ M}\Omega$$

The value of K = 14.42

Q.28 The meter constant of a single phase 230 V inductance watt hour meter is 600 rev/kWh. The speed of the meter disc in rpm for a current of 20 Amp at 0.6 p.f. lagging will be ________ rpm.

28. 27.60 (27.58 to 27.62)

Power = $230 \times 20 \times 0.6$

= 2760 W = 2.760 kW

K = 600 rev/kWh

$$\text{revolutions in rpm} = \frac{600\times 2.760}{60} \text{rpm}$$

= 27.60 rpm

Q.29 A current transformer rated $\frac{200}{20}$, has magnetizing current and loss component of exciting current as 10 A and 5 A respectively. The phase angle between secondary winding induced emf and current is 45°. The phase angle error in degree at rated current is ______ degrees.

29. 1.013 (0.90 to 1.05)

$$\theta = \left(\frac{I_\mu \cos\delta - I_c \sin\delta}{nI_s}\right) \times \frac{180}{\pi} \text{ degree} \quad \left(\text{where } n = \frac{200}{20} = 10 \text{ and } I_s = 20 \text{ A}\right)$$

$$\theta = \left(\frac{10\cos 45° - 5\sin 45°}{10\times 20}\right) \cdot \frac{180°}{\pi}$$

= 1.0124 degrees

Q.30 A voltage $V(t) = 100 \sin\omega t + 60 \cos(3\omega t - 30°) + 40 \sin(5\omega t + 45°)$ V is applied to the pressure coil circuit of a wattmeter and through the current coil a current of $I(t) = 8 \sin\omega t + 6 \sin(5\omega t + 120°)$A is passed. Reading of the wattmeter will be _______ W.

30. 431 (430 to 432)

$$V(t) = V_1 \sin\omega t + V_2 \sin(2\omega t + \theta_1) + V_3 \sin(3\omega t + \theta_2) + \cdots$$

$$I(t) = I_1 \sin \omega t + I_2 \sin 2\omega t + I_3 \sin 3\omega t + \cdots$$

So,
$$P = V(t).I(t) = \frac{1}{2}V_1 I_1 + \frac{1}{2}V_2 I_2 \cos\theta_1 + \frac{1}{2}V_3 I_3 \cos\theta_2 + \cdots$$

Here,
$$V(t) = 100 \sin\omega t + 60 \cos(3\omega t - 30°) + 40 \sin(5\omega t + 45°)\text{V}$$

$$I(t) = 8 \sin\omega t + 6 \sin(5\omega t + 120°)\text{A}$$

So, power
$$P_T = \frac{1}{2}\times 100 \times 8 + \frac{1}{2}\times 60 \times 0 + \frac{1}{2}\times 40 \times 6 \cos(120° - 45°)\text{W} = 431 \text{ Watt}$$

Q.31 For a certain dynamometer ammeter the mutual inductance M varies with deflection θ (expressed in degrees) as $M = -6 \cos(\theta + 30°)$ mH. The deflecting torque produced by a direct current of 100 mA corresponding to a deflection of 60° is ________ µN-m.

31. 60 (59.5 to 60.5)

$$\frac{dM}{d\theta} = +6 \sin(\theta + 30) \text{ mH/degree}$$

$$\left(\frac{dM}{d\theta}\right)_{\theta=60} = 6 \text{ mH/degree}$$

$$T_d = I^2 \frac{dM}{d\theta}$$

$$= 100 \times 100 \times 10^{-6} \times 6 \times 10^{-3} \text{ N-m}$$

$$= 60 \times 10^{-6} \text{ N-m}$$

$$= 60\,\mu\text{N-m}$$

Q.32 If a energy meter disc makes 30 revolutions in 200 seconds when a load of 850 W is connected to it, the meter constant is _________ rev/kWh.

32. 635.29 (635 to 636)

$$\frac{\text{Rev}}{\text{Sec}} = \frac{30}{200}$$

$$\Rightarrow \quad \frac{\text{Rev}}{\text{hr}} = \frac{30 \times 3600}{200}$$

$$\frac{\text{Rev}}{\text{kWh}} = \frac{30}{\left(\frac{200 \times 850}{1000 \times 3600}\right)}$$

$$= 635.29 \text{ rev/kWh.}$$

Q.33 Two 200 V full scale PMMC type dc voltmeter having figure of merit of 5 kΩ/V and 10 kΩ/V respectively are connected in series. The series combination can be used to measure a maximum dc voltage of ________ V.

33. 300 (295.00 to 305.00)

Figure of merit of M_1 (S_{V1}) = 5 kΩ/V

Figure of merit of M_2 (S_{V2}) = 10 kΩ/V

Full scale current through the meters are

$$I_{f1} = \frac{1}{S_{V1}} = \frac{1}{5} = 0.2 \text{ mA}$$

$$I_{f2} = \frac{1}{S_{V2}} = \frac{1}{10} = 0.1 \text{ mA}$$

In series combination, maximum current will be 0.1 mA.

Resistance of M_1 = 5 kΩ/V × 200 = 1 MΩ

Resistance of M_2 = 10 kΩ/V × 200 = 2 MΩ

Hence, maximum voltage rating

= 0.1 mA (1 MΩ + 2 MΩ)

= 300 Volt

❍❍❍❍