# SSC JE

## ELECTRICAL ENGINEERING

## PAPER - 1

### OBJECTIVE QUESTION PRACTICE PAPER SET
### ANSWER KEY

# BASIC CONCEPTS - ANSWER KEY

| Basic Concepts | | | | | Q. CODE - TS 1 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | c | 4. | c | 5. | a |
| 6. | b | 7. | b | 8. | b | 9. | d | 10 | b |

| Basic Concepts | | | | | Q. CODE - TS 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | c | 3. | b | 4. | a | 5. | b |
| 6. | d | 7. | a | 8. | b | 9. | c | 10. | b |

| Basic Concepts | | | | | Q. CODE - TS 3 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | c | 3. | b | 4. | b | 5. | d |
| 6. | a | 7. | c | 8. | d | 9. | d | 10 | b |

| Basic Concepts | | | | | Q. CODE - TS 4 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | d | 3. | c | 4. | b | 5. | a |
| 6. | a | 7. | c | 8. | d | 9. | a | 10. | a |

| Detailed Solution | Q. CODE - TS 4 |
|---|---|
| 1. | Effective Capacitance $C_T = C_1 + C_2$ |

| | |
|---|---|
| | $C_T = 8 + 8 = 16\mu F$ |
| 6. | $V = 230\ V$ and $I = 1\ A$<br>According to ohms law, $R = {}^{V}/_{I}$<br>$R = {}^{230}/_{1}$<br>$R = 230\Omega$ |

| Basic Concepts | | | | | Q. CODE - TS 5 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | c | 3. | d | 4. | c | 5. | a |
| 6. | b | 7. | b | 8. | c | 9. | b | 10 | c |

| Detailed Solution | Q. CODE - TS 5 |
|---|---|
| 3. | Charge $Q = CV$, If V = constant, Q is directly proportional to C. It means that capacitor having large capacitance will store more charge. |
| 5. | $R = {}^{V^2}/_{P} = {}^{(200)^2}/_{500} = 80\Omega$<br>External resistance $R_x$ connected series with the iron, then the total resistance $R_T$ is.<br>$R_T = {}^{V^2}/_{R}$<br>$500 = {}^{(240)^2}/_{80 + R_x} = 35.2\boldsymbol{\Omega}$ |

| Basic Concepts | | | | | Q. CODE - TS 6 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | a | 4. | d | 5. | b |
| 6. | b | 7. | c | 8. | b | 9. | c | 10. | d |

| Basic Concepts | | | | | Q. CODE - TS 7 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | a | 3. | c | 4. | c | 5. | a |
| 6. | b | 7. | b | 8. | a | 9. | d | 10 | a |

| Detailed Solution | Q. CODE - TS 7 |
|---|---|
| 7. | Energy stored in the capacitor, $E_C = \frac{1}{2}CV^2 = \frac{1}{2}(100\ X\ 10^{-6})(200)^2 = 2J$<br>When capacitor is discharged, whole energy converted into heat.<br>Therefore, Heat = Energy = $2J$ |

| Basic Concepts | | | | | Q. CODE - TS 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | d | 3. | a | 4. | b | 5. | b |
| 6. | d | 7. | c | 8. | a | 9. | b | 10. | b |

| Basic Concepts | | | | | Q. CODE - TS 9 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | c | 3. | a | 4. | d | 5. | c |
| 6. | a | 7. | a | 8. | b | 9. | d | 10 | b |

| Basic Concepts | | | | | Q. CODE - TS 10 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | b | 3. | a | 4. | a | 5. | a |
| 6. | d | 7. | b | 8. | a | 9. | b | 10. | b |

# CIRCUIT LAW - ANSWER KEY

| Circuit Law | | | | | Q. CODE - TS 11 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | d | 3. | a | 4. | b | 5. | c |
| 6. | a | 7. | c | 8. | c | 9. | b | 10 | a |
| Detailed Solution | | | | | Q. CODE - TS 11 | | | | |
| 4. | From the problem circuit,<br>$V - 6 - 6 = 0$<br>$V = 12\ V$ | | | | | | | | |

| Circuit Law | | | | | Q. CODE - TS 12 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | a | 4. | b | 5. | c |
| 6. | d | 7. | a | 8. | a | 9. | c | 10. | b |
| Detailed Solution | | | | | Q. CODE - TS 12 | | | | |
| 2. | $V_{th} = (0.1V_{th}\ X\ 5) + 4$<br>$V_{th} - (0.5V_{th}) = 4$<br>$(0.5V_{th}) = 4$<br>$V_{th} = {}^{4}/_{0.5} = 8V$ | | | | | | | | |

| Circuit Law | | | | | Q. CODE - TS 13 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | b | 3. | c | 4. | b | 5. | b |
| 6. | b | 7. | a | 8. | d | 9. | b | 10 | d |

| Detailed Solution | Q. CODE - TS 13 |
|---|---|
| 4. | Power is maximum when $R_L = R_I$<br>$R_I = 4\Omega$ and $V = 24\ V$<br>$P_{Max} = {V^2}/{4R_I} = {24^2}/{8} = {576}/{16} = 36W$ |

| Circuit Law | | | | | Q. CODE - TS 14 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | c | 3. | a | 4. | c | 5. | a |
| 6. | b | 7. | d | 8. | c | 9. | a | 10. | a |

| Detailed Solution | Q. CODE - TS 14 |
|---|---|
| 3. | Load voltage under maximum power transfer $= \mathrm{IR_L} = \left({V}/{R_L + R_I}\right) R_L$<br>$= \left({V}/{2R_L}\right) R_L$<br>$= \left({V}/{2}\right)$<br>$= \left({20}/{2}\right) = 10V$ |
| 6. | By applying KCL, $I = I_1 + I_2 + I_3$<br>$50 = 30 + 10 + I_3$<br>$I_3 = 10mA$ |

| Circuit Law | | | | | Q. CODE - TS 15 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | b | 4. | b | 5. | b |
| 6. | d | 7. | c | 8. | a | 9. | d | 10 | d |

| Circuit Law | | | | | Q. CODE - TS 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | b | 3. | a | 4. | d | 5. | c |
| 6. | c | 7. | a | 8. | c | 9. | d | 10. | d |

| Detailed Solution | Q. CODE - TS 16 |
|---|---|
| 1. | I =? V = 10 V and R = 20Ω<br>$I = {}^{V}/_{R} = {}^{10}/_{20} = 0.5A$ |
| 7. | $R_N = R_{th} = (2\Omega \| \| 6\Omega) + 3\Omega$<br>$= \left({}^{2\ X\ 6}/_{2+6}\right) + 3$<br>$= 4.5\boldsymbol{\Omega}$ |
| 8. | $I_N = 6A$ and $R_N = 200\boldsymbol{\Omega}$<br>For maximum power transfer in the load, $R_L = R_N = 200\Omega$<br>Current through load $= {}^{I_N}/_{2} = {}^{6}/_{2} = 3A$<br>$P_{Max} = (3)^2\ X\ R_L = 9\ X\ 200 = 1800W$ |
| 9. | According to ohms law,<br>$I = {}^{V}/_{R} = {}^{6}/_{1} = 6A$ |

| Circuit Law | | | | | Q. CODE - TS 17 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | a | 3. | b | 4. | b | 5. | c |
| 6. | c | 7. | a | 8. | d | 9. | d | 10 | b |

| Circuit Law | | | | | Q. CODE - TS 18 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | d | 3. | a | 4. | b | 5. | d |
| 6. | d | 7. | d | 8. | b | 9. | a | 10. | a |
| Detailed Solution | | | | | Q. CODE - TS 18 | | | | |
| 2. | When the 1 V voltage source is acting alone:<br>Current through 2Ω resistance in this case: $I' = -{}^{1}/_{3}\,A$<br>When the 1 A current source is acting alone:<br>The current through 2Ω resistance in this case: $I'' = 1\ X({}^{1}/_{3}) = 1/3A$<br>By using supper position theorem,<br>$I = I' + I''$<br>$I = -{}^{1}/_{3} + {}^{1}/_{3}$<br>$I = 0$ | | | | | | | | |

| Circuit Law | | | | | Q. CODE - TS 19 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | c | 3. | b | 4. | a | 5. | d |
| 6. | d | 7. | b | 8. | c | 9. | a | 10 | d |

| Circuit Law | | | | | Q. CODE - TS 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | b | 4. | c | 5. | d |
| 6. | b | 7. | c | 8. | d | 9. | c | 10. | b |
| Detailed Solution | | | | | Q. CODE - TS 20 | | | | |
| 9. | By the current division rule;<br>$i_X = \left(\frac{50}{25+50}\right) X(-8) = -5.33A$ | | | | | | | | |

# MAGNETIC CIRCUIT – ANSWER KEY

| Magnetic Circuit | | | | | Q. CODE - TS 21 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | c | 3. | a | 4. | a | 5. | b |
| 6. | c | 7. | b | 8. | c | 9. | b | 10 | b |

| Detailed Solution | Q. CODE - TS 21 |
|---|---|
| 10. | $P = Fv = BIlv$<br>$= 1.25\ X\ 10^{-3} X\ 50\ X\ 0.1\ X\ 1$<br>$= 6.25\ X10^{-3}$<br>$= 6.25mW$ |

| Magnetic Circuit | | | | | Q. CODE - TS 22 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | a | 3. | a | 4. | c | 5. | b |
| 6. | a | 7. | c | 8. | a | 9. | d | 10. | b |

| Detailed Solution | Q. CODE - TS 22 |
|---|---|
| 5. | Induced EMF $e = Bvl$<br>$= 0.7\ X\ 2\ X\ (10\ X10^{-2})$<br>$= 0.14\ V$ |

| Magnetic Circuit | | | | | Q. CODE - TS 23 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | a | 4. | a | 5. | a |
| 6. | b | 7. | b | 8. | a | 9. | a | 10 | b |

| Magnetic Circuit | | | | | Q. CODE - TS 24 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | c | 3. | a | 4. | b | 5. | a |
| 6. | c | 7. | a | 8. | a | 9. | d | 10. | b |

| Magnetic Circuit | | | | | Q. CODE - TS 25 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | c | 3. | c | 4. | d | 5. | d |
| 6. | a | 7. | c | 8. | a | 9. | d | 10 | b |

| Magnetic Circuit | | | | | Q. CODE - TS 26 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | b | 3. | c | 4. | a | 5. | b |
| 6. | c | 7. | a | 8. | d | 9. | b | 10. | b |

| Magnetic Circuit | | | | | Q. CODE - TS 27 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | b | 3. | b | 4. | a | 5. | a |
| 6. | d | 7. | c | 8. | c | 9. | d | 10 | a |

| Detailed Solution | | Q. CODE - TS 27 |
|---|---|---|
| 2. | Number of turns, N = 80<br>Current, I = 0.2<br>MMF = N. I = 0.2 X 80 = 16 | |

| Magnetic Circuit | | | | | Q. CODE - TS 28 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | a | 3. | b | 4. | d | 5. | a |
| 6. | a | 7. | a | 8. | c | 9. | c | 10. | d |

| Magnetic Circuit | | | | | Q. CODE - TS 29 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | c | 3. | b | 4. | c | 5. | d |
| 6. | a | 7. | c | 8. | a | 9. | b | 10 | d |

| Magnetic Circuit | | | | | Q. CODE - TS 30 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | a | 3. | a | 4. | c | 5. | d |
| 6. | a | 7. | a | 8. | a | 9. | b | 10. | b |

# AC FUNDAMENTALS - ANSWER KEY

| AC Fundamentals | | | | | Q. CODE - TS 31 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | b | 3. | b | 4. | a | 5. | c |
| 6. | c | 7. | c | 8. | b | 9. | b | 10 | c |

| Detailed Solution | Q. CODE - TS 31 |
|---|---|
| 8. | $R = 10\Omega, L = 0.01H, C = 100mF$<br>For series RLC circuit at resonance, $Q = {}^{\omega_r L}/_{R}$<br>$\omega_r = {}^{1}/_{\sqrt{LC}} = {}^{1}/_{\sqrt{0.01\ X\ 100\ X\ 10^{-3}}} = 31.623\ r/s$<br>$Q = {}^{\omega_r L}/_{R} = {}^{31.623\ X\ 0.01}/_{10} = 0.0316$ |
| 9. | Series RLC resonance frequency, $f_r = {}^{1}/_{2\pi\sqrt{LC}}$<br>All the components (R, L, C) are doubled, then $f = {}^{1}/_{2\pi\sqrt{2L\ X\ 2C}} = {}^{1}/_{4\pi\sqrt{LC}}$<br>$f = {}^{f_r}/_{2}$ |

| AC Fundamentals | | | | | Q. CODE - TS 32 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | a | 4. | c | 5. | a |
| 6. | c | 7. | b | 8. | b | 9. | c | 10. | a |

| Detailed Solution | Q. CODE - TS 32 |
|---|---|
| 2. | Power Factor, $cos\varphi = {}^{R}/_{Z} = {}^{30}/_{50} = 0.6$<br>$X_C > X_L$, circuit is capacitive in nature. Therefore, power factor is leading. |
| 8. | $V_C = Q\ X\ Supply\ Voltage$<br>$= 40\ X\ 6$<br>$= 240\ V$ |

| AC Fundamentals | | | | | Q. CODE - TS 33 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | c | 4. | a | 5. | c |
| 6. | a | 7. | d | 8. | b | 9. | d | 10 | b |

| AC Fundamentals | | | | | Q. CODE - TS 34 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | a | 4. | d | 5. | b |
| 6. | a | 7. | d | 8. | d | 9. | c | 10. | c |

| Detailed Solution | Q. CODE - TS 34 |
|---|---|
| 5. | $V_R = 3V, V_L = 4V, V_C = 5V$<br>Magnitude of supply voltage, $V = \sqrt{{V_R}^2 + (V_C - V_L)^2}$<br>$V = \sqrt{3^2 + (5-4)^2}$<br>$V = \sqrt{10}$<br>$V = 3.162\ V$ |
| 8. | For a parallel RLC circuit, $Q = R\sqrt{\frac{C}{L}} = 40\sqrt{\frac{0.25}{4}} = 10$ |
| 10. | $P = VI\ cos\varphi$<br>$cos\varphi = {}^{P}/_{VI} = {}^{220}/_{200\ X\ 2} = {}^{220}/_{400}$ |

| | |
|---|---|
| | $cos\varphi = 0.55$ |

| AC Fundamentals | | | | | Q. CODE - TS 35 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | c | 3. | c | 4. | b | 5. | a |
| 6. | c | 7. | a | 8. | d | 9. | c | 10 | c |

| Detailed Solution | Q. CODE - TS 35 |
|---|---|
| 1. | Power consumed, $P = VI\ cos\varphi = VI(^{R}/_{Z})$<br>$I = (^{V}/_{Z})$<br>$Z = (^{V}/_{I}) = {}^{200}/_{20} = 10$<br>$P = 200\ X\ 20\ X\ (^{6}/_{10})$<br>$P = 2400\ W$ |

| AC Fundamentals | | | | | Q. CODE - TS 36 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | b | 4. | a | 5. | b |
| 6. | c | 7. | b | 8. | d | 9. | d | 10. | c |

| AC Fundamentals | | | | | Q. CODE - TS 37 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | d | 3. | a | 4. | c | 5. | c |
| 6. | c | 7. | b | 8. | c | 9. | a | 10 | a |

| AC Fundamentals | | | | | Q. CODE - TS 38 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | c | 4. | b | 5. | c |
| 6. | a | 7. | d | 8. | a | 9. | d | 10. | c |

| Detailed Solution | Q. CODE - TS 38 |
|---|---|
| 5. | Impedance at resonant frequency is minimum in series RLC circuit. So, when frequency increases or decreases, impedance value is increases. |
| 6. | $V_{RMS} = \sqrt{\frac{1}{T}\int_0^T 10^2 dt} = 10\ V$ |
| 7. | $f_r = {}^1/_{2\pi\sqrt{LC}}$<br>$f\ \alpha\ {}^1/_{\sqrt{C}} = {}^1/_{\sqrt{16}} = {}^1/_4\ Times$ |
| 10. | Applied voltage, $V = \sqrt{{V_R}^2 + {V_L}^2}$<br>$V = \sqrt{(250)^2 + (200)^2}$<br>$V = 320V$ |

| AC Fundamentals | | | | | Q. CODE - TS 39 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | d | 3. | b | 4. | b | 5. | b |
| 6. | c | 7. | b | 8. | c | 9. | b | 10 | c |

| AC Fundamentals | | | | | Q. CODE – TS 40 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | d | 4. | b | 5. | d |
| 6. | d | 7. | a | 8. | d | 9. | a | 10. | c |

# MEASUREMENT AND MEASURING INSTRUMENTS - ANSWER KEY

| Measurements | | | | | Q. CODE - TS 41 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | c | 4. | d | 5. | c |
| 6. | b | 7. | d | 8. | d | 9. | d | 10 | b |

| Measurements | | | | | Q. CODE - TS 42 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | d | 4. | b | 5. | a |
| 6. | d | 7. | b | 8. | c | 9. | a | 10. | c |

| Detailed Solution | Q. CODE - TS 42 |
|---|---|
| 4. | Peak voltage value if vertical distance between positive and negative peak is “a” and scale set is “b”.<br>$V = {}^{a\ X\ b}/_{2} = {}^{6\ X\ 3}/_{2} = {}^{18}/_{2} = 9mV$ |

| Measurements | | | | | Q. CODE - TS 43 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | c | 4. | b | 5. | b |
| 6. | d | 7. | c | 8. | b | 9. | d | 10 | b |

| Measurements | | | | | Q. CODE - TS 44 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | b | 3. | b | 4. | c | 5. | a |
| 6. | a | 7. | a | 8. | b | 9. | c | 10. | c |
| Detailed Solution | | | | | Q. CODE - TS 44 | | | | |
| 10. | Total Power $P = 2000 + 1500 = 3500$ | | | | | | | | |

| Measurements | | | | | Q. CODE - TS 45 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | a | 3. | b | 4. | c | 5. | d |
| 6. | a | 7. | a | 8. | c | 9. | c | 10 | d |
| Detailed Solution | | | | | Q. CODE - TS 45 | | | | |
| 3. | Meter reading $= 1$ X Average amplitude $= 1$ X $200 = 200$ V | | | | | | | | |

| Measurements | | | | | Q. CODE - TS 46 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | a | 4. | b | 5. | c |
| 6. | c | 7. | a | 8. | d | 9. | b | 10. | d |

| Measurements | | | | | Q. CODE - TS 47 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | b | 4. | a | 5. | c |
| 6. | a | 7. | b | 8. | c | 9. | a | 10 | c |

| Measurements | | | | | Q. CODE - TS 48 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | c | 3. | a | 4. | c | 5. | c |
| 6. | b | 7. | d | 8. | a | 9. | c | 10. | d |

| Detailed Solution | Q. CODE - TS 48 |
|---|---|
| 1. | Sensitivity = 1000Ω / volt<br>Full scale current = 1 mA<br>Therefore, half the full scall current is 0.5 A. |
| 6. | Multiplying Power = $^{I}/_{I_M}$<br>$I - Current\ of\ circuity\ to\ be\ measured$<br>$I_M - Current\ passing\ through\ ammeter$<br>$10 = {}^{100}/_{I_M}$<br>$I_M = {}^{100}/_{10} = 10mA$ |

| Measurements | | | | | Q. CODE - TS 49 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | a | 3. | b | 4. | b | 5. | a |
| 6. | c | 7. | a | 8. | a | 9. | b | 10 | c |

| Measurements | | | | | Q. CODE - TS 50 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | d | 3. | b | 4. | c | 5. | a |
| 6. | b | 7. | b | 8. | c | 9. | b | 10 | d |

# ELECTRICAL MACHINES - ANSWER KEY

| Electrical Machines | | | | | Q. CODE - TS 51 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | d | 3. | d | 4. | a | 5. | d |
| 6. | c | 7. | b | 8. | d | 9. | d | 10 | c |

| Detailed Solution | Q. CODE - TS 51 |
|---|---|
| 2. | EMF equation, $E_g = {\varphi PNZ}/{60A}$<br>A – Area of cross section. A = 2 for wave winding and A = P for lap winding |
| 7. | $I_a = ?, E = 200V, V = 220V, R_a = 0.5\Omega$<br>For motor, $E = V - I_a R_a$<br>$200 = 220 - I_a(0.5)$<br>$200 - 220 = -I_a(0.5)$<br>$-I_a = {-20}/{0.5} = 40A$ |

| Electrical Machines | | | | | Q. CODE - TS 52 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | d | 3. | d | 4. | b | 5. | a |
| 6. | b | 7. | d | 8. | d | 9. | a | 10. | b |

| Detailed Solution | Q. CODE - TS 52 |
|---|---|
| 1. | $f = 50Hz, V_s = E_1 = 6000, V_0 = E_2 = 250V, \varphi_m = 0.06, N_1 = ?$<br>$E_1 = 4.44 f \varphi_m N_1$<br>$N_1 = {E_1}/{4.44 f \varphi_m} = {6000}/{4.44\ X\ 50\ X\ 0.06} = 450\ Turns$ |
| 2. | Power transformer – 132kV / 11kV<br>Isolation transformer – 230V / 230V<br>Auto transformer – 220V / 240V |

| | |
|---|---|
| | Welding transformer – 400V / 100V |
| 4. | Core loss, $P_i = VI_0 cos\varphi_0$<br>$P_i = 230\ X\ 5\ X\ 0.25$<br>$= 288W$ |
| 5. | Load for maximum efficiency $= Full\ load\ KVA\ X\ \sqrt{P_i/P_C}$<br>$= 100\ X\ \sqrt{1/2}$<br>$= 70.7\ KVA$ |
| 6. | Change in speed = no load speed – full load speed<br>= 800 – 760<br>= 40 r.p.m |

| Electrical Machines | | | | | Q. CODE - TS 53 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | d | 3. | a | 4. | b | 5. | a |
| 6. | b | 7. | b | 8. | d | 9. | a | 10 | c |

| Electrical Machines | | | | | Q. CODE - TS 54 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | b | 3. | d | 4. | d | 5. | b |
| 6. | b | 7. | a | 8. | b | 9. | c | 10. | c |

| Detailed Solution | Q. CODE - TS 54 |
|---|---|
| 5. | $E_1 = 2000, E_2 = 200, N_2 = 40, N_1 = ?$<br>$\frac{E_2}{E_1} = \frac{N_2}{N_1}$<br>$\frac{200}{2000} = \frac{40}{N_1}$<br>$200N_1 = 2000\ X\ 40$<br>$N_1 = 400\ Turns$ |
| 9. | $Power\ transferred\ Inductively = (1 - K)X\ Input$ |

| | |
|---|---|
| | $= (1 - 0.8) X\ 20$<br>$= 4\ kW$ |

| Electrical Machines | | | | | Q. CODE - TS 55 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | a | 3. | d | 4. | b | 5. | d |
| 6. | c | 7. | b | 8. | b | 9. | a | 10 | c |
| Detailed Solution | | | | | Q. CODE - TS 55 | | | | |
| 7. | $The\ stator\ MMF\ at\ syncgronous\ speed, N_s = {}^{120f}/_{p} = {}^{120\ X\ 50}/_{6} = 1000\ r.p.m$<br><br>Full load speed $N = (1 - s) X\ N_s$<br>$N = (1 - 0.03) X\ 1000$<br>$N = (0.97) X\ 1000$<br>$N = 970\ r.p.m$ | | | | | | | | |

| Electrical Machines | | | | | Q. CODE - TS 56 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | b | 3. | d | 4. | c | 5. | d |
| 6. | c | 7. | b | 8. | d | 9. | d | 10. | c |
| Detailed Solution | | | | | Q. CODE - TS 56 | | | | |
| 6. | $N_s = {}^{120f}/_{p} = {}^{120\ X\ 50}/_{4} = 1500\ r.p.m$<br>$s = {}^{(N_s - N)}/_{N_s}\ X100$<br>$0.5 = {}^{(1500 - N)}/_{1500}\ X100$<br>$N = 1425\ r.p.m$ | | | | | | | | |

| Electrical Machines | | | | | Q. CODE - TS 57 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | c | 3. | d | 4. | a | 5. | a |
| 6. | d | 7. | b | 8. | b | 9. | c | 10 | b |

| Detailed Solution | Q. CODE - TS 57 |
|---|---|
| 7. | Output KVA for maximum efficiency $= Full\ load\ KVA\ X\ \sqrt{{P_i}/{P_C}}$<br>$= 500\ X\ \sqrt{{500}/{2000}}$<br>$= 250\ KVA$ |
| 10. | $f_2 = sf_1 \Rightarrow 2 = s\ X\ 50$<br>$s = \frac{2}{50} = 0.04$<br>Speed, $N = \frac{120f}{p} = \frac{120\ X\ 50(1-0.04)}{8} = 720\ r.p.m$ |

| Electrical Machines | | | | | Q. CODE - TS 58 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | a | 3. | c | 4. | b | 5. | b |
| 6. | c | 7. | a | 8. | c | 9. | d | 10. | a |

| Detailed Solution | Q. CODE - TS 58 |
|---|---|
| 6. | $I = {(E-e)}/{R}$<br>$2 = {(220-e)}/{26} \Rightarrow 52 = 220 - e \Rightarrow e = 168\ V$ |
| 9. | $\frac{V_p}{V_s} = \frac{N_p}{N_s}$<br>$N_p = \left(\frac{V_p}{V_s}\right) N_s \Rightarrow \left(\frac{230}{2300}\right) X\ 1800 \Rightarrow 180$ |

| Electrical Machines | | | | | Q. CODE - TS 59 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | c | 4. | b | 5. | c |
| 6. | b | 7. | d | 8. | c | 9. | b | 10. | c |

| Electrical Machines | | | | | Q. CODE - TS 60 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | d | 3. | b | 4. | a | 5. | b |
| 6. | d | 7. | b | 8. | d | 9. | d | 10. | d |

# SYNCHRONOUS MACHINES - ANSWER KEY

| Synchronous Machine | | | | | Q. CODE - TS 61 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | d | 3. | d | 4. | c | 5. | b |
| 6. | a | 7. | c | 8. | c | 9. | a | 10 | d |

| Detailed Solution | Q. CODE - TS 61 |
|---|---|
| 1. | $f = {PN_s}/{120}$<br>Where $P - Number\ of\ poles$<br>$N_s - synchronous\ speed$<br>$f - frequency$ |
| 2. | Synchronous motor is that its power factor can be controlled by variation of its field current. This is the reason why in most large industrial installation part of the load is usually handled by synchronous motor which are operated at leading power factor. |
| 10. | $f = {PN_s}/{120}$<br>$f = {8\ X\ 900}/{120}$<br>$f = 60Hz$ |

| Synchronous Machine | | | | | Q. CODE - TS 62 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | d | 3. | c | 4. | d | 5. | b |
| 6. | a | 7. | d | 8. | b | 9. | d | 10. | a |

| Synchronous Machine | | | | | Q. CODE - TS 63 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | d | 3. | d | 4. | c | 5. | b |
| 6. | b | 7. | c | 8. | d | 9. | a | 10 | c |

| Synchronous Machine | | | | | Q. CODE - TS 64 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | a | 3. | d | 4. | a | 5. | b |
| 6. | a | 7. | d | 8. | d | 9. | a | 10. | a |

| Synchronous Machine | | | | | Q. CODE - TS 65 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | d | 4. | c | 5. | b |
| 6. | c | 7. | a | 8. | a | 9. | a | 10 | a |

| Synchronous Machine | | | | | Q. CODE - TS 66 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | b | 4. | c | 5. | d |
| 6. | a | 7. | a | 8. | b | 9. | d | 10. | d |

| Synchronous Machine | | | | | Q. CODE - TS 67 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | c | 3. | a | 4. | b | 5. | d |
| 6. | d | 7. | c | 8. | b | 9. | d | 10 | a |

| Detailed Solution | | Q. CODE - TS 67 |
|---|---|---|
| 6. | $Synchronous\ Speed, N_s = {}^{120f}/_{P} = {}^{120\ X50}/_{10} = 600\ r.p.m$<br>$\omega_s = \frac{600\ X\ 2\pi}{60} = 20\pi rad/sec$<br>$Power\ = T\omega = \frac{50}{\pi} X\ 20\pi = 1000\ W$ | |

| Synchronous Machine | | | | | Q. CODE - TS 68 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | d | 4. | a | 5. | a |
| 6. | b | 7. | b | 8. | c | 9. | d | 10. | a |

| Synchronous Machine | | | | | Q. CODE - TS 69 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | d | 3. | c | 4. | d | 5. | c |
| 6. | c | 7. | d | 8. | c | 9. | d | 10. | d |

| Synchronous Machine | | | | | Q. CODE - TS 70 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | b | 3. | c | 4. | c | 5. | a |
| 6. | d | 7. | a | 8. | a | 9. | a | 10. | d |

# GENERATION, TRANSMISSION AND DISTRIBUTION - ANSWER KEY

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 71 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | c | 4. | a | 5. | b |
| 6. | b | 7. | d | 8. | a | 9. | d | 10 | c |
| Detailed Solution | | | | | Q. CODE - TS 71 | | | | |
| 4. | $Reserve\ Capacity = Plant\ capacity - Maximum\ demand$<br>$Reserve\ Capacity = 22000 - 20000$<br>$Reserve\ Capacity = 2000KW$ | | | | | | | | |

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 72 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | c | 3. | d | 4. | c | 5. | c |
| 6. | a | 7. | c | 8. | d | 9. | b | 10. | c |
| Detailed Solution | | | | | Q. CODE - TS 72 | | | | |
| 9. | $P.S.M = \frac{Fault\ Current}{Pickup\ current} = \frac{30}{7.5} = 4$ | | | | | | | | |

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 73 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | a | 3. | d | 4. | d | 5. | d |
| 6. | b | 7. | a | 8. | d | 9. | c | 10 | a |
| Detailed Solution | | | | | Q. CODE - TS 73 | | | | |
| 5. | $Zero\ sequence\ component = {}^{1}/_{3}\ X\ [Maximum\ demand]$<br>$= {}^{1}/_{3}\ X\ [15]$<br>$= 5A$ | | | | | | | | |

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 74 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | d | 13. | c | 14. | d | 15. | b |
| 16. | c | 17. | c | 18. | a | 19. | b | 20. | a |
| Detailed Solution | | | | | Q. CODE - TS 74 | | | | |
| 10. | $SIL = {}^{(KV)^2}/_{Z_s} = {}^{(400)^2}/_{400} = 400MW$ | | | | | | | | |

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 75 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | d | 3. | c | 4. | a | 5. | d |
| 6. | d | 7. | a | 8. | a | 9. | b | 10 | c |

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 76 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | c | 3. | d | 4. | c | 5. | d |
| 6. | a | 7. | a | 8. | d | 9. | a | 10. | a |

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 77 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | b | 4. | c | 5. | d |
| 6. | b | 7. | b | 8. | a | 9. | d | 10 | a |

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 78 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11. | c | 12. | d | 13. | a | 14. | b | 15. | d |
| 16. | c | 17. | d | 18. | c | 19. | a | 20. | d |
| Detailed Solution | | | | | Q. CODE - TS 78 | | | | |
| 8. | Maximum value of Restriking voltage, $V = 2\,X\,E_{Peak}$<br>$V = 2\,X\,\frac{20}{\sqrt{3}}\,X\sqrt{2}$<br>$= 2\,X\,11.56\,X1.414$<br>$= 32.7KV$ | | | | | | | | |

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 79 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | d | 4. | b | 5. | c |
| 6. | d | 7. | c | 8. | d | 9. | c | 10 | d |

| Generation, Transmission and Distribution | | | | | Q. CODE - TS 80 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | b | 4. | a | 5. | a |
| 6. | a | 7. | a | 8. | d | 9. | d | 10 | c |

# ESTIMATION AND COSTING - ANSWER KEY

| Estimation and Costing | | | | | Q. CODE - TS 81 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | a | 3. | a | 4. | b | 5. | a |
| 6. | d | 7. | c | 8. | a | 9. | c | 10 | c |

| Estimation and Costing | | | | | Q. CODE - TS 82 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | a | 3. | d | 4. | a | 5. | d |
| 6. | d | 7. | a | 8. | b | 9. | b | 10. | a |

| Estimation and Costing | | | | | Q. CODE - TS 83 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | a | 4. | c | 5. | b |
| 6. | d | 7. | b | 8. | d | 9. | c | 10 | a |

| Estimation and Costing | | | | | Q. CODE - TS 84 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | d | 4. | c | 5. | b |
| 6. | d | 7. | c | 8. | c | 9. | a | 10. | b |

| Estimation and Costing | | | | | Q. CODE - TS 85 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | b | 3. | b | 4. | a | 5. | d |
| 6. | a | 7. | b | 8. | d | 9. | b | 10 | b |

| Estimation and Costing | | | | | Q. CODE - TS 86 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | a | 3. | c | 4. | a | 5. | b |
| 6. | d | 7. | b | 8. | c | 9. | c | 10. | b |

| Estimation and Costing | | | | | Q. CODE - TS 87 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | d | 3. | b | 4. | b | 5. | a |
| 6. | d | 7. | a | 8. | c | 9. | b | 10 | a |

| Estimation and Costing | | | | | Q. CODE - TS 88 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | c | 3. | a | 4. | a | 5. | b |
| 6. | d | 7. | b | 8. | a | 9. | d | 10. | d |

| Estimation and Costing | | | | | Q. CODE - TS 89 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | b | 3. | c | 4. | a | 5. | d |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 6. | d | 7. | c | 8. | d | 9. | d | 10 | c |

| Estimation and Costing | | | | | Q. CODE - TS 90 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | d | 3. | c | 4. | b | 5. | d |
| 6. | a | 7. | c | 8. | b | 9. | c | 10. | d |

# UTILIZATION OF ELECTRICAL ENERGY - ANSWER KEY

| Utilization of Electrical Energy | | | | | Q. CODE - TS 91 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | d | 3. | a | 4. | b | 5. | a |
| 6. | c | 7. | b | 8. | d | 9. | b | 10 | d |

| Utilization of Electrical Energy | | | | | Q. CODE - TS 92 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | a | 3. | b | 4. | c | 5. | c |
| 6. | a | 7. | d | 8. | a | 9. | b | 10. | a |

| Utilization of Electrical Energy | | | | | Q. CODE - TS 93 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | b | 3. | c | 4. | d | 5. | a |
| 6. | b | 7. | c | 8. | c | 9. | c | 10 | c |

| Utilization of Electrical Energy | | | | | Q. CODE - TS 94 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | a | 3. | c | 4. | b | 5. | d |
| 6. | c | 7. | d | 8. | c | 9. | d | 10. | d |

| Utilization of Electrical Energy | | | | | Q. CODE - TS 95 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | a | 3. | d | 4. | d | 5. | c |
| 6. | c | 7. | c | 8. | d | 9. | c | 10 | b |

| Utilization of Electrical Energy | | | | | Q. CODE - TS 96 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | d | 3. | b | 4. | c | 5. | d |
| 6. | c | 7. | d | 8. | d | 9. | b | 10. | d |

| Utilization of Electrical Energy | | | | | Q. CODE - TS 97 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | d | 3. | c | 4. | d | 5. | c |
| 6. | a | 7. | a | 8. | a | 9. | b | 10 | b |

| Detailed Solution | Q. CODE - TS 97 |
|---|---|
| 6. | $Area, A = {\pi d^2}/{4} = 44.18m^2$ and $E = 800\ lux$<br><br>Flux reaching the surface = 800 X 44.18 = 35,344 lm<br>Total flux per lamp = ${35{,}344}/{0.4} = 88{,}360\ lm$<br>Lamp wattage = ${88360}/{20} = 4420\ watt$ |
| 9. | Total flux $= 4\ X\ 3.14\ X\ 50$<br>$= 628\ lumans$ |
| 10. | $Illumination = {candle\ Power}/{Square\ of\ distance}$<br><br>$Candle\ Power = 6\ X\ (5)^2 = 150$ |

| Utilization of Electrical Energy | | | | | Q. CODE - TS 98 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | a | 4. | d | 5. | c |
| 6. | c | 7. | d | 8. | d | 9. | d | 10. | d |
| Detailed Solution | | | | | Q. CODE - TS 98 | | | | |
| 4. | $Flux, \varphi = 4\pi L = 4\ X\ 3.14\ X\ 3.53\ X10^{27}$<br>$\varphi = 4.43\ X10^{28} lm$ | | | | | | | | |

| Utilization of Electrical Energy | | | | | Q. CODE - TS 99 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | a | 3. | b | 4. | a | 5. | c |
| 6. | c | 7. | b | 8. | a | 9. | c | 10. | a |
| Detailed Solution | | | | | Q. CODE - TS 99 | | | | |
| 2. | $Maximum\ illumination, = \left({}^{C.P}/_{h^2}\right) = \left({}^{600}/_{10^2}\right) = 6\ lux.$ | | | | | | | | |

| Utilization of Electrical Energy | | | | | Q. CODE - TS 100 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | d | 4. | b | 5. | c |
| 6. | a | 7. | c | 8. | c | 9. | c | 10. | d |
| Detailed Solution | | | | | Q. CODE - TS 100 | | | | |
| 2. | $Lumen\ per\ watt = \left({}^{Output\ of\ lamp\ in\ lumens}/_{Wattage\ of\ lamp}\right)$<br>$= \left({}^{1200}/_{240\ X\ 0.2}\right) = 25$ | | | | | | | | |

# BASIC ELECTRONICS - ANSWER KEY

| Basic Electronics | | | | | Q. CODE - TS 101 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | a | 4. | b | 5. | d |
| 6. | a | 7. | d | 8. | d | 9. | c | 10 | c |

| Basic Electronics | | | | | Q. CODE - TS 102 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | c | 3. | d | 4. | b | 5. | c |
| 6. | c | 7. | b | 8. | b | 9. | d | 10. | d |

| Basic Electronics | | | | | Q. CODE - TS 103 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | d | 2. | c | 3. | c | 4. | c | 5. | b |
| 6. | d | 7. | a | 8. | b | 9. | c | 10 | a |

| Basic Electronics | | | | | Q. CODE - TS 104 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | b | 3. | a | 4. | c | 5. | b |
| 6. | d | 7. | d | 8. | a | 9. | c | 10. | c |

| Basic Electronics | | | | | Q. CODE - TS 105 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | b | 3. | b | 4. | d | 5. | b |
| 6. | a | 7. | b | 8. | b | 9. | d | 10 | a |

| Basic Electronics | | | | | Q. CODE - TS 106 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | b | 2. | a | 3. | c | 4. | d | 5. | b |
| 6. | a | 7. | c | 8. | c | 9. | a | 10. | a |

| Basic Electronics | | | | | Q. CODE - TS 107 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | d | 3. | a | 4. | c | 5. | a |
| 6. | b | 7. | a | 8. | a | 9. | b | 10 | d |

| Detailed Solution | Q. CODE - TS 107 |
|---|---|
| 6. | $I_E = 25mA$ , $I_C = 20mA$<br>$\alpha = {}^{I_C}/_{I_E} = {}^{20}/_{25} = 0.8$ |

| Basic Electronics | | | | | Q. CODE - TS 108 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | a | 3. | d | 4. | d | 5. | c |
| 6. | d | 7. | a | 8. | b | 9. | b | 10. | c |

| Basic Electronics | | | | | Q. CODE - TS 109 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | b | 3. | a | 4. | d | 5. | d |
| 6. | b | 7. | c | 8. | d | 9. | c | 10. | d |

| Basic Electronics | | | | | Q. CODE - TS 110 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | c | 3. | c | 4. | c | 5. | c |
| 6. | a | 7. | a | 8. | a | 9. | b | 10. | a |

# GENERAL AWARENESS - ANSWER KEY

| General Awareness | | | | | Q. CODE - TS 111 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | a | 3. | b | 4. | b | 5. | b |
| 6. | a | 7. | c | 8. | b | 9. | b | 10 | d |

| General Awareness | | | | | Q. CODE - TS 112 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | b | 3. | c | 4. | b | 5. | c |
| 6. | d | 7. | c | 8. | c | 9. | b | 10. | a |

| General Awareness | | | | | Q. CODE - TS 113 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | d | 3. | b | 4. | a | 5. | a |
| 6. | a | 7. | c | 8. | d | 9. | c | 10. | d |

# GENERAL INTELLIGENCE & REASONING – ANSWER KEY

| General Intelligence and Reasoning | | | | | Q. CODE - TS 114 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | d | 3. | b | 4. | a | 5. | b |
| 6. | d | 7. | c | 8. | c | 9. | a | 10 | d |

| General Intelligence and Reasoning | | | | | Q. CODE - TS 115 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | a | 2. | b | 3. | a | 4. | a | 5. | b |
| 6. | b | 7. | d | 8. | b | 9. | d | 10. | c |

| General Intelligence and Reasoning | | | | | Q. CODE - TS 116 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | c | 2. | b | 3. | b | 4. | a | 5. | c |
| 6. | c | 7. | d | 8. | c | 9. | a | 10. | d |

# FULL LENGTH TEST PAPER - ANSWER KEY

| Full Length Practice Set | | | | | Q. CODE - TS 117 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Part – A (General Intelligence and Reasoning) | | | | | | | | | |
| 1. | a | 2. | d | 3. | c | 4. | b | 5. | d |
| 6. | d | 7. | c | 8. | c | 9. | d | 10 | c |
| 11. | d | 12. | d | 13. | d | 14. | c | 15. | b |
| 16. | c | 17. | d | 18. | a | 19. | a | 20. | b |
| 21. | d | 22. | b | 23. | a | 24. | c | 25. | c |
| 26. | c | 27. | c | 28. | c | 29. | b | 30. | d |
| 31. | b | 32. | c | 33. | a | 34. | c | 35. | a |
| 36. | b | 37. | a | 38. | c | 39. | c | 40. | b |
| 41. | a | 42. | a | 43. | d | 44. | c | 45. | b |
| 46. | b | 47. | d | 48. | c | 49. | a | 50. | b |
| Part – B (General Awareness) | | | | | | | | | |
| 51. | d | 52. | b | 53. | c | 54. | a | 55. | b |
| 56. | c | 57. | c | 58. | c | 59. | c | 60. | d |
| 61. | a | 62. | c | 63. | c | 64. | a | 65. | b |
| 66. | c | 67. | c | 68. | c | 69. | c | 70. | b |

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| 71. | c | 72. | c | 73. | b | 74. | d | 75. | d |
| 76. | b | 77. | a | 78. | d | 79. | b | 80. | a |
| 81. | c | 82. | d | 83. | b | 84. | c | 85. | b |
| 86. | b | 87. | c | 88. | d | 89. | d | 90. | b |
| 91. | d | 92. | c | 93. | a | 94. | b | 95. | b |
| 96. | d | 97. | c | 98. | d | 99. | c | 100. | c |
| Part – C (Electrical Engineering) | | | | | | | | | |
| 101. | a | 102. | b | 103. | a | 104. | a | 105. | d |
| 106. | b | 107. | c | 108. | a | 109. | a | 110. | a |
| 111. | d | 112. | a | 113. | b | 114. | c | 115. | c |
| 116. | d | 117. | d | 118. | d | 119. | d | 120. | b |
| 121. | a | 122. | d | 123. | c | 124. | b | 125. | b |
| 126. | a | 127. | b | 128. | b | 129. | a | 130. | c |
| 131. | a | 132. | b | 133. | d | 134. | c | 135. | d |
| 136. | d | 137. | c | 138. | b | 139. | a | 140. | c |
| 141. | a | 142. | b | 143. | a | 144. | b | 145. | a |
| 146. | c | 147. | d | 148. | a | 149. | b | 150. | d |
| 151. | c | 152. | c | 153. | d | 154. | c | 155. | c |
| 156. | b | 157. | b | 158. | c | 159. | c | 160. | b |
| 161. | a | 162. | b | 163. | c | 164. | d | 165. | d |

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| 166. | c | 167. | d | 168. | b | 169. | b | 170. | b |
| 171. | a | 172. | b | 173. | b | 174. | b | 175. | d |
| 176. | d | 177. | b | 178. | c | 179. | d | 180. | b |
| 181. | a | 182. | a | 183. | d | 184. | c | 185. | a |
| 186. | c | 187. | a | 188. | d | 189. | c | 190. | d |
| 191. | c | 192. | a | 193. | d | 194. | b | 195. | c |
| 196. | d | 197. | b | 198. | a | 199. | d | 200. | c |

| Full Length Practice Set – 1 Detailed Solution | |
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| 7. | $18:5::12:?$<br>$\frac{18}{3}-1=5$ and $\frac{12}{3}-1=3$ |
| 8. | $5:21::7:?$<br>$(5\ X\ 5)-4=21$ and $(7\ X\ 7)-6=43$ |
| 9. | $3:27::4:?$<br>$3^3=27$ and $4^3=64$ |
| 13. | Option a, b and c backward motion. Option d alone forward motion. |
| 15. | Option a, b and d are from vowels and option d is not from vowels. |
| 17. | Option a, b and c are prime number and Option d is not prime number |
| 18. | Option b, c and d natural numbers. |
| 26. | 4, 6, 9, 12 and 14 are composite number. But 7 is prime number |

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| 31. | Portal → It is a type of door. Other options are windows. |
| 40. | $63X24 + 8 \div 4 + 2 - 3 = ?$<br><br>$63 - 24 \div 8 + 4 \div 2X3 = ?$<br><br>$63 - 3 + 2X3 = 66$ |
| 110. | $D = 100cm^2/s$ and $\tau = 100\mu s$.<br>The diffusion length, $L = \sqrt{D.\tau}$<br>$L = \sqrt{100\ X\ 100\ X10^{-6}} = 0.1cm.$ |
| 114. | $V = 220, R_a = 1\Omega, I_a = 20A$<br>Running as motor: $E = V - I_aR_a$<br>$E = 220 - (20)(1) = 200V$<br>Running as motor: $E = V + I_aR_a$<br>$E = 220 + (20)(1) = 220V$<br>Difference $= 220 - 200 = 20V$ |
| 115. | Copper loss $= \left(\frac{1}{2}\right)^2 X\ 2400 = 600W$ |
| 116. | $x = \sqrt{\frac{P_i}{P_c}} = \sqrt{\frac{400}{600}} = 0.817$<br>Load at which maximum efficiency, $=$ "$x$" $X$ $Full\ load\ KVA$<br><br>$=$ "0.817" $X$ 50<br>$= 40.83\ KVA$ |
| 121. | $X_{PU} = {}^{X_{Actual}}/_{Z_b}$<br><br>$Z_b = {}^{(KV_b)^2}/_{MVA_b} = {}^{(10)^2}/_{100} = 1\Omega$<br><br>$X_{PU} = {}^{X_{Actual}}/_{Z_b} = \frac{6}{1} = 6PU$ |

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| 130. | $Z_{23} = Z_{32} = {}^{1}/_{Y_{23}} = {}^{1}/_{-(j20)} = j0.2$ |
| 138. | $Diversity\ factor = {}^{Sum\ of\ individual\ maximum\ demand}/_{Maximum\ demand}$<br>$= {}^{(2000+800+200+400)}/_{2500}$<br>$= {}^{(3400)}/_{2500}$<br>$= 1.36$ |
| 143. | $G = \frac{{}^{\Delta R}/_{R}}{{}^{\Delta l}/_{l}}$<br>${}^{\Delta R}/_{R} = 2\ X\ 10^{-5}$<br>$\Delta R = 120\ X\ 2\ X\ 10^{-5} = 2.4\ X\ 10^{-3}\Omega$ |
| 155. | Temperature rise = 50 – 30 = $30^0C$<br>Resistance increases 0.393% at every degree.<br>Therefore, 30 X 0.393 = 11.79%. This represents an increase of 0.1179 X 40 ohm in resistance or 4.716 ohm. Therefore, $50^0C \Rightarrow 40 + 4.716 = 44.716\Omega$ |
| 158. | The given circuit is open circuited, therefore no current flows through the resistor. No voltage drops across the resistor. Therefore, V = 8V. |
| 160. | Replacing the current source and its 2 Ω parallel resistance with an equivalent voltage source in series with a 2 Ω resistance.<br>$I = \frac{4-2}{2+2} = 0.5A$<br>$V_{th} = V_{ab} = 2\ X\ 0.5 + (-4) = -3V$ |

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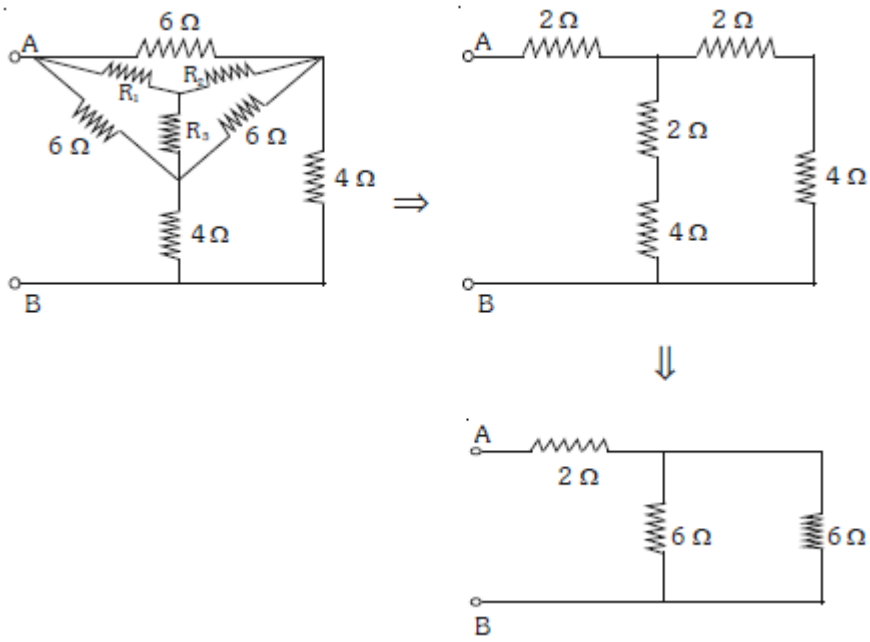
| 162. |  <br>$R_{AB} = 2 + \left(\frac{6X6}{6+6}\right)$<br>$= 2 + \left(\frac{36}{12}\right)$<br>$= 5\Omega$ |
| 163. | An ideal voltage source should provide constant voltage drop irrespective of the value of current flowing through it. As the internal resistance in case of ideal voltage source is zero. |
| 164. | $1\mu F, 1\mu F \; and \; 2\mu F$ are connected in parallel,<br>$C_T = C_1 + C_2 + C_3$<br>$= 1 + 1 + 2$<br>$= 4\mu F$ |
| 165. | Apply KVL, $V_B = V_A + 3 - (3\ X\ 1) - (3\ X\ 6)$<br>$V_A - V_B = 3 - (3\ X\ 1) - (3\ X\ 6)$<br>$V_A - V_B = 18V$ |
| 171. | $Coil\ span = (16 - 1) = 15\ slots \rightarrow Which\ falls\ short\ by\ three\ slots$<br>$\alpha = {}^{180^0 X 3}/_{18} = 30^0$<br>Pitch factor for fundamental:<br>$K_P = \cos {}^{\alpha}/_{2} = {}^{30^0}/_{2} = 0.966$ |

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| | Pitch factor for 3rd harmonics:<br>$K_P = \cos {}^{\alpha}/_{2} = {}^{3X30}/_{2} = 0.707$ |
| 187. | $Q = CV$<br>$r = {}^{1}/_{4\pi\varepsilon_0}$<br>$V = {}^{Q}/_{4\pi\varepsilon_0 r} = {}^{Q}/_{4\pi\varepsilon_0} X\ 4\pi\varepsilon_0 = Q\ volts$<br>$Q = CV = CQ$<br>Therefore $C = 1\ F$ |