**BASICS OF ELECTRICAL & ELECTRONICS (BEEE) QUESTION BANK**

**UNIT I**

**PART – A: (Multiple Choice Questions)**

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| **1** | **Kirchhoff’s voltage Law is applicable for *\_\_\_\_\_*only.**  (a)Loop (b) Joints (c) Both (d) None of these  ANS-A | **[CO1] [PO1]** |
| **2** | **Superposition theorem is applicable only to the circuits having *\_\_\_\_* circuit elements.**  (a)Linear (b) Non-linear, (c) Inclined (d) Damped  ANS-A | **[CO1] [PO1]** |
| **3** | **The potential of a reference junction is \_\_\_\_\_?**  (a)0 , (b) Infinite (c) 1 (d) None of these  ANS-D | **[CO1] [PO1]** |
| **4** | **The work done per a charge to move that charge from infinite to a point is called *\_\_\_\_\_* that point?**  (a)Current (b) Voltage (c)Power (d)None of these  ANS-D | **[CO1] [PO1]** |
| **5** | **Thevenin’s Equivalent Circuit diagram is like \_\_\_\_\_\_\_\_\_\_\_\_.**  (a)Voltage source (b) current Source (c) Energy Source (d) none of these  ANS-A | **[CO1] [PO1]** |
| **6** | **Norton’s equivalent Circuit diagram is like \_\_\_\_\_\_.**  (a)Voltage source (b) current Source (c) Energy Source (d) none of these.  ANS-B | **[CO1] [PO1]** |
| **7** | **In nodal voltage method the available unknown equations are \_\_\_\_\_\_\_\_ ?**  (a)Node -1 (b) Loop -1 (c) Equal to nos. of node (d) Equals to Loops  ANS-A | **[CO1] [PO1]** |
| **8** | **Kirchhoff’s current Law is applicable at *\_\_\_\_*only**.  (a)Loop (b) Joints (c) Both (d) None of these  ANS-B | **[CO1] [PO1]** |
| **9** | **An Ideal voltage source should have *\_\_\_\_\_\_\_\_* internal resistance.**  (a)Zero resistance (b) Infinite resistance (c) Both (d) none of these  ANS-A | **[CO1] [PO1]** |
| **10** | **An Ideal current source should have *\_\_\_\_\_\_\_\_*internal resistance.**  (a)Zero resistance (b) Infinite resistance (c) Both (d) none of these  ANS-B | **[CO1] [PO1]** |
| **11** | **The expression for resistance in terms of specific resistance and area of cross section is\_\_\_\_\_\_\_\_\_\_\_.**  (a)*R= (ρl)/A,* (b) *R=Al/ ρ,* (c) *R= (ρA)/l,* (d) *R= (A)/ ρl*  ANS-A | **[CO1] [PO1]** |
| **12** | **Thevenin’s Equivalent resistance Rth is found \_\_\_\_\_\_\_\_\_\_\_\_** (a) by removing voltage sources along with their internal resistances  (b) by short-circuiting the given two terminals (c) between any two 'open' terminals  (d) between same open terminals as for Eth  ANS-D | **[CO1] [PO1]** |
| **13** | **To determine the polarity of the voltage drop across a resistor, it is necessary to know \_\_\_\_\_\_\_\_\_\_**  (a) value of current through the resistor (b) direction of current through the resistor (c) value of resistor (d) e.m.f.s in the circuit.  ANS-B | **[CO1] [PO1]** |
| **14** | **An ideal voltage source should have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.** (a) large value of e.m.f. (b) small value of e.m.f. (c) zero source resistance (d) infinite source resistance  **ANS-C** | **[CO1] [PO1]** |
| **15** | **Kirchhoffs current law is applicable to only\_\_\_\_\_\_\_\_\_\_\_\_\_\_-.** (a) junction in a network (b) closed loops in a network (c) electric circuits (d) electronic circuits  ANS-A | **[CO1] [PO1]** |
| **16** | **Kirchhoffs voltage law is related to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.** (a) junction currents (b) battery e.m.fs.  (c) IR drops (d) both (b) and (c) (e) none of the above  ANS-D | **[CO1] [PO1]** |
| **17** | **Peak or Amplitude factor is the ratio of \_\_\_\_to \_\_\_\_\_?**  (a)Maximum Value &Minimum Value  (b) RMS Value & Maximum value  (c) Maximum value & RMS Value  (d) RMS Value & Average Value  **ANS-C** | **[CO2] [PO1]** |
| **18** | **The form factor of sinusoidal wave is \_\_\_\_\_?**  (a)1.12 (b) 1.11 (c) 1.123 (d) 1.15  ANS-A | **[CO2] [PO1]** |
| **19** | **The power factor of a pure resistive circuit is \_\_\_\_\_\_\_\_\_\_?**  (a)1, (b) 0 , (c) 2, (d) Infinite.  ANS-A | **[CO2] [PO1]** |
| **20** | **The power factor of a pure capacitive circuit is \_\_\_\_ ?**  (a)1 (b) 2 (c) 0 (d) None of these.  ANS-C | **[CO2] [PO1]** |
| **21** | **The power factor is the ratio of \_\_\_\_\_ power and \_\_\_\_\_ power?**  (a)Active & Apparent (b) Apparent & Active  (c) Real & Active (d) None of these  **ANS-B** | **[CO2] [PO1]** |
| **22** | **If current lags the voltage in an AC circuit then the circuit is \_\_\_\_\_\_\_\_ ?**   1. R-L in series (b) R-C in series   (c) R-L-C in series (d) None of these  **ANS-A** | **[CO2] [PO1]** |
| **23** | **If net reactance are vanishes then the circuit is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**   1. Capacitive (b) Inductive (c) Resonance (d) None of these   ANS-C | **[CO2] [PO1]** |
| **24** | **RMS stands for \_\_\_\_\_\_\_\_\_\_\_\_ a)** Root Mean Square b) Root Mean Sum c) Root Maximum sum d) Root Minimum Sum  **ANS-A** | **[CO2] [PO1]** |
| **25** | **What is the relation between r.m.s value of current and maximum value of current?** a) Irms =Im/2 b) Irms = Im /√2 c) Irms = Im /4 d) Irms = Im  **ANS-B** | **[CO2] [PO1]** |

**PART – B: (Short Answer Questions)**

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| **1** | Draw the Thevenin’s equivalent circuit? | **[CO1] [PO1]** |
| **2** | Explain how the voltage source with a source resistance can be converted into an equivalent current source. | **[CO1] [PO1]** |
| **3** | Differentiate between an ideal voltage and a practical voltage source. | **[CO1] [PO1]** |
| **4** | In a given circuit, three identical resistances each of value 15Ω are connected in star. Find the equivalent resistances in delta | **[CO1] [PO1]** |
| **5** | What is the difference between ideal and practical current source | **[CO1] [PO1]** |
| **6** | Three resistances of 60Ω each are connected in delta . Find out star equivalent of combination. | **[CO1] [PO1]** |
| **7** | Explain very briefly the superposition principle of finding out current in one particular branch of a network containing several voltage and current sources | **[CO1] [PO1]** |
| **8** | Explain difference between Short Circuit and Open Circuit. | **[CO1] [PO1]** |
| **9** | Write down the equation of a sinusoidal source voltage of 50 Hz frequency and RMS value of 210V. | **[CO2] [PO2]** |
| **10** | What is the time constant of a RL series circuit having R = 10Ω and L=31 mH. | **[CO2] [PO2]** |
| **11** | Two impedances (2+j4) and (4+j7) are connected in series find the equivalent impedance in polar form. | **[CO2] [PO2]** |
| **12** | A 3-phase, 50 Hz, 415V, 6 pole induction motor runs at 960 rpm. What is the slip of the induction motor? | **[CO2] [PO2]** |
| **13** | Two impedances (2+j3) and (5+j7) are connected in series then what would be the resultant power factor? | **[CO2] [PO2]** |
| **14** | What is the RMS value of an alternating quantity? Find the RMS and average value of a sinusoidal quantity specified by: v = 100 sin 314t. | **[CO2] [PO2]** |
| **15** | Three identical impedances connected in delta draw a current of (2 < 300)A, when connected across a 440V, 50 Hz AC supply. Find the phase current and total power consumption. | **[CO2] [PO2]** |
| **16** | Define RMS value of a sinusoidal quantity, Also justify that the effective value is same as the RMS value. | **[CO2] [PO1]** |
| **17** | Two impedances of value (5+j7) and (8-j2) are connected in parallel. What would be the net impedance of the combination? What would be the phase difference between the voltage and the current? | **[CO2] [PO2]** |
| **18** | In a series RC circuit, the supply voltage is 13V and the voltage across the resistor is 6V.Find the voltage across the capacitor and the phase angle between supply voltage and the current. | **[CO2] [PO2]** |
| **19** | Three identical impedances connected in delta draw a line current of 5 < 300 A, when connected across a 400V, 50 Hz, 3-phase AC supply. Find the current, resistance and reactance per phase. | **[CO2] [PO2]** |
| **20** | What is the RMS value of the given periodic current: i(t) = cos 450t + 2 cos 450t | **[CO2] [PO2]** |
| **21** | An AC is given by: I = 100 sinπt, after how many seconds the current will reach 50A. | **[CO2] [PO2]** |
| **22** | An alternating voltage V=160+j120 volts is applied to a circuit and current flows I= -6+j15amp. What is impedance of circuit. | **[CO2] [PO2]** |
| **23** | An alternating voltage of (100 + j100)V is applied to a circuit and the current flowing is (-10+j10)A. Find the impedance of the circuit | **[CO2] [PO2]** |
| **24** | Find the impedance of the circuit when an alternating voltage 100+j100 V is applied to it and the resulting current becomes 20-j20 A. | **[CO2] [PO2]** |
| **25** | Define Peak factor And form factor of alternating Quantity | **[CO2] [PO1]** |

**PART – C: (Long Answer Questions)**

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| **Q.1** | | | |
| A | Find out the current through 100Ω resistor by Mesh Analysis. [7M]  C:\Users\sony\Corel\Desktop\GIET GUNUPUR\BEE AICTE material\New folder\Untitled.jpg | 15 Marks | **[CO1] [PO2]** |
| B | Calculate the current ‘I’ using Thevenin’s theorem. [8M] | **[CO1] [PO2]** |
| **Q.2** | | |  |
| A | Using superposition theorem find the current through 10Ω resistance.[8] | 15 Marks | **[CO1] [PO2]** |
| B | Applying Nodal analysis to the given circuit below, calculate the current flowing through 2Ω and 5Ω resistances.[7] | **[CO1] [PO2]** |
| **Q.3** | | |  |
| A | Find the voltage drop across 4Ω and 12Ω resistances in the given circuit.[7] | 15 Marks | **[CO1] [PO2]** |
| B | Find the potential drops across 5 ohm resistor using Norton’s Theorem.[8] | **[CO1] [PO2]** |
| **Q.4** | | | |
| **A** | Calculate the resistance RLM from the circuit below.[8] | 15 marks | **[CO1] [PO2]** |
| **B** | Calculate the resistance RLO from the circuit below.[7] | **[CO1] [PO2]** |
| **Q.5** |  |  |  |
| **A** | In the circuit of figure below, find current through 1 Ω resistor using both Thevenin's Theorem and superposition theorem. [7] | 15 marks | **[CO1] [PO2]** |
| **B** | Determine current i1, i2 and i 3 using mesh analysis method for fig below[8] | **[CO1] [PO2]** |
| **Q.6** | | | |
| **A** | Calculate the effective value of a sinusoid e.m.f over the period 0 to 2π by integration method? [7M] | 15 Marks | [CO2] [PO1] |
| **B** | In a series circuit containing pure resistance and a pure inductance, the current and the voltage are expressed as :  i (t)=5 sin (314 t + 2 π/3) and v (t) = 15 sin (314 t + 5 π/6)  (a) What is the impedance of the circuit? (b) What is the value of the resistance? (c) What is the inductance in henrys? (d) What is the average power drawn by the circuit? (e) What is the power factor? [8M] | [CO2] [PO2] |
| **Q.7** | | | **OR** |
| A | A pure resistance of 50 ohms is in series with a pure capacitance of 100 microfarads. The series combination is connected across 100-V, 50-Hz supply.  Find (a) the impedance (b) current (c) power factor (d) phase angle (e) voltage across resistor (f) voltage across capacitor. [7M] | 15 Marks | **[CO2] [PO2]** |
| B | A resistance of 20 Ω, an inductance of 0.2 H and a capacitance of 100 μ F are connected in series across 220-V, 50-Hz mains. Determine the following (a) impedance (b) current (c) voltage across R, L and C (d) power in watts and VA (e) p.f. and angle of lag. [8M] | **[CO2] [PO2]** |
| **Q.8** | | |  |
| A | A resistance of 20 ohms, an inductor of 20H and acapacitor of 200microfarad are connected to a single phase 230V AC supply. Find the condition for maximum current in the circuit, and the required frequency of thr supply source that would be the impedance and power factor of the circuit during this condition. [8M] | 15 Marks | **[CO2] [PO2]** |
| B | A balanced 3-phase star load has load impedance of (10+j20) ohms per phase and is supplid from a balanced 3-ph 400V, 50 Hz AC supply. Draw the phasor diagram indicating the values of (i) line voltages, Phase voltages and (ii) line currents, phase currents. [7M] | **[CO2] [PO2]** |
| **Q.9** | | |  |
| A | Calculate the combined impedance and admittance in polar form when three impedances of values (10 <600)ohm, (5+j7)ohm and (6-j8)ohms are connected in series. [7M] | 15 Marks | **[CO2] [PO2]** |
| B | A three phase balanced inductive load consumes 25Kw power from a three phase 415V, 50Hz balanced source at a power factor of 0.8 lagging. Calculate the input line current of the load. How much current will flow in each phase of the load?   1. If it is delta connected 2. If it is star connected [8M] | **[CO2] [PO2]** |
| **Q.10** | | |  |
| A | A balanced star connected load has resistance of 10Ω and inductance of 50mH per phase is connected to a three phase supply of 440v and 50Hz. Find the i) Line current ii) phase current iii)Power factor iv)Active and Reactive power consumed by network. [8M] | 15 Marks | **[CO2] [PO2]** |
| B | A balanced three phase delta load has load impedance of 10+j25 ohms per phase and is supplied from a balanced three phase 400V, 50Hz,AC supply Calculate the values of (i) line voltages, phase voltages (ii) line currents, phase currents (iii)total real power consumed by the load. [7M] | **[CO2] [PO2]** |
| **Q.11** | | |  |
| A | A resistance of 20Ω, an inductance of 0.2H and a capacitance of 100µF are connected in series across 220V, 50Hz mains. Determine the following (a) impedance (b) current (c) voltage across R, L and C (d) power in watts and VA (e) power factor and power factor angle.  [8M] | 15 Marks | **[CO2] [PO2]** |
| B | Two impedances Z1 and Z2 when connected separately across a 230V, 50-Hz supply consumed 100 W and 60 W at power factors of 0.5 lagging and 0.6 leading respectively. If these impedances are now connected in series across the same supply, find : (i) total power absorbed and overall p.f. (ii) the value of the impedance to be added in series so as to raise the overall p.f. to unity. [7M] | **[CO2] [PO2]** |
| **Q.12** | | | |
| **A** | A circuit takes a current of 3 A at a power factor of 0.6 lagging when connected to an 115V, 50-Hz supply. Another circuit takes a current, of 5 A at a power factor of 0.707 leading when connected to the same supply. If the two circuits are connected in series across a 230-V, 50Hz supply, calculate (a) the current (b) the power consumed and (c) the power factor. [8M] | 15 Marks | **[CO2] [PO2]** |
| **B** | Two coils A and B are connected in series across a 240-V, 50-Hz supply. The resistance of A is 5 Ω and the inductance of B is 0.015 H. If the input from the supply is 3 kW and 2 kVAR, find the inductance of A and the resistance of B. Calculate the voltage across each coil. [7M] | **[CO2] [PO2]** |

**UNIT-II**

**PART – A: (Multiple Choice Questions)**

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| **1** | The unit of magnetic field intensity is *\_\_\_\_\_\_\_\_\_\_\_\_\_*?  (a)AT/m (b) Am/T (c) Tm/A (d) None  ANS-B | **[CO3] [PO1]** |
| **2** | What is the relative permeability of a air?   1. 1 (b) 2 (c) 0 (d)1   ANS-A | **[CO3] [PO1]** |
| **3** | The loop obtained from BH- curve of a ferromagnetic material is *\_\_\_\_\_*loop.  (a)Eddy Current Loss (b)Hysteresis Loss  (c) Maxwell’s (d) None of these  ANS-B | **[CO3] [PO1]** |
| **4** | In the action of transformer *\_\_\_\_\_\_\_\_\_\_\_\_\_\_* remains constant.  (a)Voltage (b) Current (c) Frequency (d) Power  ANS-D | **[CO3] [PO1]** |
| **5** | The expression for voltage transformation ratio for an Ideal transformer is\_?   1. 0 (b) 1 (c) ½ (d) None of these   ANS-B | **[CO3] [PO1]** |
| **6** | The core of a transformer is laminated to reduce *\_\_\_\_\_* loss.  (a)Eddy Current Loss (b)Hysteresis Loss  (c) Maxwell’s loss (d) None of these  ANS-A | **[CO3] [PO1]** |
| **7** | Silicon Sheet of Steel is used in the transformer core to reduce *\_\_\_\_\_\_*loss.   1. Eddy Current Loss (b)Hysteresis Loss   (c) Maxwell’s loss (d) None of these  ANS-B | **[CO3,PO1]** |
| **8** | The current flowing in the transformer when output is open circuited is called *\_\_\_\_?*   1. No Load Current (b) Magnetizing Current 2. ( c) Working component of Current (d) None of these   ANS-A | **[CO3,PO1]** |
| **9** | Which of the following does not change in a transformer?  a) Current  b) Voltage  c) Frequency  d) All of the above  ANS-C | **[CO3,PO1]** |
| **10** | If ‘Ns’ is the synchronous speed and ‘s’ is the slip, then actual running speed of an induction motor will be  a) Ns  b) s × N  c) (1-s)Ns  d) (Ns-1)s  ANS-C | **[CO3,PO1]** |
| **11** | In the action of transformer \_\_\_\_\_\_\_ remains constant**.** (i)Frequency (ii) Time period (T) (iii) Voltage (iv) Current  ANS-A | **[CO3,PO1]** |
| **12** | The EMF equation of a transformer in the secondary winding is \_\_\_\_\_\_\_\_\_\_\_\_?  **(i)** E1 = (4.44 f N1BmaxA) **(ii)** E2 = (4.44 f N2BmaxA) **(iii)** E = (0.414 f N1BmaxA) **(iv)**[Both (i) & (ii)]  ANS-D | **[CO3,PO1]** |
| **13** | Hysteresis loss is reduced by \_\_\_\_\_\_\_\_\_\_\_\_\_ & Eddy current loss is minimized by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (i) Taking Pure material & Coating of Varnish for insulation purpose  (ii) Alloyed materials & Insulating by the help of coating of Varnish or Mica  (iii) Alloyed materials & magnetically isolated (iv) None of these.  ANS-B | **[CO3,PO1]** |
| **14** | The core of a transformer is laminated to reduce \_\_\_\_ loss.  a) Hysteresis b) eddy current c) copper d) none  ANS-B | **[CO3,PO1]** |
| **15** | The number of parallel paths in a wave winding is\_\_\_\_\_\_\_\_\_   1. 2 b) P c) 2P d)P/2   ANS-A | **[CO3,PO1]** |
| **16** | The number of parallel paths in a lap winding is\_\_\_\_\_\_\_\_\_   1. 2 b) P c) 2P d)P/2   ANS-B | **[CO3,PO1]** |
| **17** | The current flowing in the transformer when output is open circuited is called \_\_\_\_\_\_\_?  a) No load current b) full load current c) demagnetizing current d) none  ANS-A | **[CO3,PO1]** |
| **18** | For a star connected load, Phase voltage = \_\_\_\_\_\_ X Line voltage.  (a)1/√3 (b) √3 (c) √3/2 (d) None of these.  ANS-A | **[CO2][PO1]** |
| **19** | For a star connected load, Phase current = \_\_\_\_\_\_\_\_\_\_\_ × Line current.  (a)0 (b) 1 (c) ½ (d) None of these  ANS-B | **[CO2][PO1]** |
| **20** | For a Delta connected load, Phase voltage = \_\_\_\_\_\_\_\_\_ × Line voltage.   1. 1/√3 (b) √3 (c) 1 (d) 0   ANS-C | **[CO2][PO1]** |
| **21** | For a Delta connected load, Phase current = \_\_\_\_\_\_\_\_ × Line current.  (a)1/√3 (b) √3 (c) 1 (d) 0  ANS-A | **[CO2][PO1]** |

**PART – B: (Short Answer Questions)**

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| **1** | Why the core of a transformer is laminated? | **[CO3] [PO1]** |
| **2** | What do you mean by magnetism and magnetic field? | **[CO3] [PO1]** |
| **3** | What do you understand by retentivity? | **[CO3] [PO1]** |
| **4** | What do you mean by residual magnetism and coercivity? | **[CO3] [PO1]** |
| **5** | A single phase transformer develops 200V at the secondary terminals on no load condition. If the secondary winding has 1000 turns, Find the maximum flux in the core. Assume a 30V, 50 Hz single phase in the primary. | **[CO3] [PO2]** |
| **6** | Define coercivity and retentivity with reference to Magnetism | **[CO3] [PO1]** |
| **7** | What do you mean by Synchronous speed? Also define ‘slip’ of a three phase induction motor. | **[CO3] [PO1]** |
| **8** | Explain briefly MMF | **[CO3] [PO1]** |
| **9** | Why the cores used in a transformer are laminated | **[CO3] [PO1]** |
| **10** | Define retentivity and permeability with reference to magnetic circuits | **[CO3] [PO1]** |
| **11** | Explain briefly magnetic leakage and fringing | **[CO3] [PO1]** |
| **12** | How can you minimize Hysteresis loss? | **[CO3] [PO1]** |
| **13** | How can you minimize Eddy current loss? | **[CO3] [PO1]** |
| **14** | Write down the voltage transformation ratio constant equation of a  Single phase transformer? | **[CO3] [PO1]** |
| **15** | Write down the emf equation of a single phase transformer? | **[CO3] [PO1]** |
| **16** | Mention different types of transformer. | **[CO3] [PO1]** |
| **17** | A transformer with 40 turns on high voltage winding is used to step down the voltage from 240V to 120V. Find the number of turns in low voltage winding. | **[CO3] [PO1]** |
| **18** | What do you mean by the term ‘Slip’ of a 3-phase Induction Motor? Calculate the slip of 6 pole induction motor running at 1140 rpm while being connected to a 60 Hz three phase AC source. | **[CO3] [PO1]** |
| **19** | Write the EMF equation of a DC generator | **[CO3] [PO1]** |
| **20** | What is back emf in a DC motor? Explain with suitable diagram. | **[CO3] [PO1]** |

**PART – C: (Long Answer Questions)**

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| **Q.1** | | | |
| A | Draw the equivalent circuit of transformer with different parameters. [7M] | 15 Marks | **[CO3] [PO1]** |
| B | A single phase, 50Hz transformer has 80 turns on primary winding and 400 turns on secondary winding. The net cross-sectional area of the core is 200 cm2. If the primary winding is connected to 240V, 50Hz supply, detremine a) e.m.f induced in secondary winding b) Maximum value of flux density in the core. [8M] | **[CO3] [PO2]** |
| **Q.2** | | | |
| A | Explain B-H curve with the help of a neat diagram. [7M] | 15 Marks | **[CO3] [PO1]** |
| B | A 400V, 4-pole, 3-Ф 50Hz star connected Induction motor has a rotor resistance and reactance per phase are 0.01 Ω and 0.1 Ω respectively.  Determine  (a) starting torque  (b) slip at which Maximum torque will occur  (c) Maximum Torque. [8M] | **[CO3] [PO2]** |
| **Q.3** | | |  |
| A | Derive the expression for the emf induced in a DC generator. [7M] | 15 Marks | **[CO3] [PO1]** |
| B | The primary of a single phase transformer is connected to 200V, 50 Hz supply. If the flux in the core is 12mWb, what is the no of turns in the primary? How many no of turns required in the secondary to obtain a voltage of 110V.[8M] | **[CO3] [PO2]** |
| **Q.4** | | |  |
| A | Derive the EMF equation of a single phase transformer.[7 M] | 15 Marks | **[CO3] [PO1]** |
| B | A 25 KVA transformer has 500 turns on the primary and 50 turns in the secondary winding. The primary is connected to 3000 volts, 50 Hz supply. Find the full load primary and secondary currents, the secondary emf and maximum flux in the core. Neglect leakage drops and no load primary current.[8M] | **[CO3] [PO2]** |
| **Q.5** | | |  |
| A | Explain the principle of operation of a single phase transformer. [7M] | 15 Marks | **[CO3] [PO1]** |
| B | Explain the principle of operation of a DC generator [8M] | **[CO3] [PO2]** |
| **Q.6** | | |  |
| A | Explain about different types of DC generators with suitable diagrams[7M] | 15 Marks | **[CO3] [PO1]** |
| B | A magnetic circuit in the form of an iron ring comprises of a closed iron path of length 250mm and cross sectional area of 50mm2. A coil of 1000 turns is wound on the iron ring. Estimate the coil current to create a flux density of 0.25T in the iron ring assuming all the flux to pass through the given iron ring of the magnetic circuit. The relative permeability of iron is 2000 and the value of µ0=4π×10-7H/m. .[8M] | **[CO3] [PO2]** |
| **Q.7** | | | |
| A | A 4 pole 3 phase Induction Motor operates from a supply whose frequency is 50Hz. Calculate:  (a)The speed at which the magnetic field of the stator is rotating  (b)The speed of the rotor when the slip is 0.04  (c) The frequency of the rotor currents when the slip is 0.03  (d) the frequency of the rotor currents at standstill. [8M] | 15 Marks | **[CO3] [PO2]** |
| B | Describe the construction, operations, Types , Principle and functions of 3 phase Induction Motor.[7 M] | **[CO3] [PO1]** |

**UNIT-III**

**PART – A: (Multiple Choice Questions)**

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| --- | --- | --- |
| **1** | **If Vm is the peak voltage across the secondary of a transformer in a half**  **wave rectifier (without filter circuit), then the maximum voltage on the**  **reverse biased diode is**  (a) Vm  (b) 2 Vm  (c) 0.5 Vm  (d) 4 Vm  ANS-A | **[CO4] [PO1]** |
| **2** | **In a full wave rectifier, the current in each diode flows for**  (a) Whole cycle of the input signal  (b) More than half cycle of the input signal  (c )Half cycle of the input signal  (d)None of these  ANS-C | **[CO4] [PO1]** |
| **3** | **The knee voltage of a crystal diode is approximately equal to**   1. Applied voltage 2. break down voltage 3. forward voltage 4. barrier potential.   ANS-D | **[CO4] [PO1]** |
| **4** | **If the arrow of crystal diode symbol is positive w.r.t. bar, then diode is ………….. Biased.**   1. forward 2. reverse 3. either forward or reverse 4. none of the above   ANS-A | **[CO4] [PO1]** |
| **5** | **The reverse current in a diode is of the order of………..**   1. kA 2. mA 3. μA 4. A   ANS-C | **[CO4] [PO1]** |
| **6** | **If the PIV rating of a diode is exceeded ………………**   1. the diode conducts poorly 2. the diode is destroyed 3. the diode behaves like a zener diode 4. none of the above   ANS-B | **[CO4] [PO1]** |
| **7** | **A crystal diode is used as ……………**   1. an amplifier 2. a rectifier 3. an oscillator 4. a voltage regulator   ANS-B | **[CO4] [PO1]** |
| **8** | **An ideal crystal diode is one which behaves as a perfect ……….. When forward biased.**   1. Conductor 2. Insulator 3. resistance material 4. semiconductor   **ANS-A** | **[CO4] [PO1]** |
| **9** | **The leakage current in a crystal diode is due to …………….**   1. minority carriers 2. majority carriers 3. junction capacitance 4. none of the above   ANS-A | **[CO4] [PO1]** |
| **10** | **Bridge rectifier is an alternative for** a) Full wave rectifier b) Peak rectifier c) Half wave rectifier d) None of the mentioned  ANS-A | **[CO4] [PO1]** |
| **11** | **A semiconductor is formed by ……… bonds.**  a) Covalent  b) Electrovalent  c) Co-ordinate  d) None of the above  ANS-A | **[CO4] [PO1]** |
| **12** | **A semiconductor has ………… temperature coefficient of resistance.**  a) Positive  b) Zero  c) Negative  d) None of the above  ANS-C | **[CO4] [PO1]** |
| **13** | **A semiconductor has generally ……………… valence electrons.**  a) 2  b) 3  c) 6  d) 4  ANS-D | **[CO4] [PO1]** |
| **14** | **When a pure semiconductor is heated, its resistance …………..**  a) Goes up  b) Goes down  c) Remains the same  d) Can’t say  ANS-B | **[CO4] [PO3]** |
| **15** | **When a pentavalent impurity is added to a pure semiconductor, it becomes ………**  a) An insulator  b) An intrinsic semiconductor  c) p-type semiconductor  d) n-type semiconductor  ANS-D | **[CO4] [PO1]** |
| **16** | **As the doping to a pure semiconductor increases, the bulk resistance of the semiconductor ………..**  a) Remains the same  b) Increases  c) Decreases  d) None of the above  ANS-C | **[CO4] [PO1]** |
| **17** | **A forward biased pn junction diode has a resistance of the order of**  a) Ω  b) kΩ  c) MΩ  d) None of the above  ANS-A | **[CO4] [PO1]** |
| **18** | **A reverse bias pn junction has …………**  a) Very narrow depletion layer  b) Almost no current  c) Very low resistance  d) Large current flow  ANS-B | **[CO4] [PO1]** |
| **19** | **A pn junction acts as a ……….**  a) Controlled switch  b) Bidirectional switch  c) Unidirectional switch  d) None of the above  ANS-C | **[CO4] [PO1]** |
| **20** | **A transistor is a …………… operated device**  a) current  b) voltage  c) both voltage and current  d) none of the above  ANS-A | **[CO4] [PO2]** |
| **21** | **The relation between β and α is …………..**  a) β = 1 / (1 – α )  b) β = (1 – α ) / α  c) β = α / (1 – α )  d) β = α / (1 + α )  ANS-C | **[CO4] [PO1]** |
| **22** | **If the doping level of a crystal diode is increased, the breakdown voltage………….**  a) remains the same  b) is increased  c) is decreased  d)none of the above  ANS-C | **[CO4] [PO1]** |
| **23** | **The knee voltage of a crystal diode is approximately equal to ………….**  a) applied voltage  b) breakdown voltage  c) forward voltage  d) barrier potential  ANS-D | **[CO4] [PO1]** |
| **24** | **The dc current gain in common collector configuration is given by**  a) α  b) β  c) β + 1  d) α + 1  ANS-C | **[CO4] [PO1]** |
| **25** | **What is the relationship between ICEO& ICBO?**  a) ICEO= ( β+1) ICBO  b) ICEO=( β-1) ICBO  c) ICEO= α (ICBO)  d) ICEO= (1+α) (ICBO)  ANS-A | **[CO4] [PO1]** |
| **26** | **The early effect in a bipolar junction transistor is caused by**  (a) large emitter-base reverse bias  (b) large collector-base reverse bias  (c) fast turn-on  (d) fast turn-off  **ANS-B** | **[CO4] [PO1]** |
| **27** | **A transistor has a current amplification factor of 250 and a base current, IB, of 20 μA. The collector current, IC, equals:**   1. 500 μA 2. 5mA 3. 50A 4. 5A   **ANS-B** | **[CO4] [PO1]** |
| **28** | **A BJT is a ………… driven device**   1. Current 2. Voltage 3. both current and voltage 4. none of these   **ANS-A** | **[CO4] [PO1]** |
| **29** | **Transistor biasing is done to keep ………… in the circuit?**   1. Proper direct current 2. Proper alternating current 3. The base current small 4. Collector current small   **ANS-A** | **[CO2] [PO1]** |
| **30** | **For faithful amplification by a transistor circuit, the value of VBE should ………. for a silicon transistor?**   1. Be zero 2. Be 0.01 V 3. Not fall below 0.7 V 4. Be between 0 V and 0.1 V   **ANS-D** | **[CO4] [PO1]** |
| **31** | **The operating point is also called the ………….?**   1. Cut off point 2. Quiescent point 3. Saturation point 4. None of the above   **ANS-B** | **[CO4] [PO1]** |
| **31** | **What is the relationship between ICEO& ICBO?**   1. ICEO= ( β+1) ICBO 2. ICEO=( β-1) ICBO 3. ICEO= α ICBO 4. ICEO= (1+α) (ICBO)   **ANS-A** | **[CO4] [PO1]** |
| **33** | **The dc current gain in common collector configuration is given by**   1. α 2. β 3. β + 1 4. α + 1   **ANS-C** | **[CO4] [PO1]** |

**PART – B: (Short Answer Questions)**

|  |  |  |
| --- | --- | --- |
| **1** | Find the dc resistance of a forward bias diode having forward dc current of 2.5mA at room temperature. | **[CO4] [PO1]** |
| **2** | Define Peak Inverse Voltage of a rectifier. What are PIV for full wave  centre tapped and bridge rectifiers? | **[CO4] [PO2]** |
| **3** | Define avalanche break-down voltage & Zener break-down Voltage. | **[CO4] [PO1]** |
| **4** | Why the resistance of semiconductor material decreases with increases in temperature? | **[CO4] [PO1]** |
| **5** | What is the difference between zenner and avalanche breakdown? Which  of the among is generally used for high voltage application ? | **[CO4] [PO1]** |
| **6** | Calculate the frequency andtime period of the following sinusoidal signal f (t) = 5 sin (300 t). | **[CO4] [PO2]** |
| **7** | A diode is operated at room temperature with Is = 10-10 A and ɳ = 2.  (i) What is the diode current I0 if the voltage across the diode is V0 = 0.65 V? (ii) What voltage V0 is required for a diode current ofI200 μA? | **[CO4] [PO3]** |
| **8** | A silicon sample at room temperature is dopedwith acceptor atoms so that  NA= 1016cm-3 and ND = 0. Is the material p-type or n-type? If p0 = 1016 cm-3, what is the electron concentration, n0 at room temperature? | **[CO4] [PO1]** |
| **9** | Find the frequencies f and ω of a sine wave signal with a time period of 1ms. | **[CO4] [PO3]** |
| **10** | Give at least two examples of semiconductor materials which are used for LED. | **[CO4] [PO2]** |
| **11** | A Periodic digital waveform has pulse width of 25 μs and a period of 150μs.  Determine the frequency and duty cycle.? | **[CO4] [PO3]** |
| **12** | Define peak inverse voltage (PIV) of a semiconductor diode? | **[CO4] [PO1]** |
| **13** | Find out the maximum efficiency of the full wave rectifier? | **[CO4] [PO2]** |
| **14** | What is a negative clamper? | **[CO4] [PO1]** |
| **15** | A HWR uses a diode with an resistance of 0.5Ω.if input ac voltage is 20V (r.m.s) and load resistance of 5Ω, Calculate the maximum output current(Imax). | **[CO4] [PO2]** |
| **16** | What are the majority charge carriers in p-type and n-type semiconductors? | **[CO4] [PO1]** |
| **17** | If the input frequency to a full wave rectifier is 50 Hz, find out the frequency of the rectifier output. | **[CO4] [PO1]** |
| **18** | A half wave rectifier uses a diode with an equivalent forward resistance of 0.3Ω.if input ac voltage is 10V (r.m.s) and load resistance of 2Ω,Calculate the average output current (Iavg). | **[CO4] [PO1]** |
| **19** | What is an ideal diode? | **[CO4] [PO1]** |
| **20** | What is the basic difference between p-type and n-type semiconductor? | **[CO4] [PO1]** |
| **21** | Define biasing and justify its necessity. | **[CO4] [PO1]** |
| **22** | What do you mean by biasing of a circuit? | **[CO4] [PO2]** |
| **23** | Define the term thermal runaway in case of transistor. | **[CO4] [PO2]** |
| **24** | Write down the relationship between ICO & ICEO? | **[CO4] [PO1]** |
| **25** | Why a BJT is called as current controlled device. | **[CO4] [PO1]** |
| **26** | Define biasing and justify its necessity. | **[CO4] [PO1]** |
| **27** | What do you mean by biasing of a circuit? | **[CO4] [PO2]** |
| **28** | Define the term thermal runaway in case of transistor. | **[CO4] [PO2]** |
| **29** | Write down the relationship between ICO & ICEO? | **[CO4] [PO1]** |
| **30** | A waveform occupies six divisions of an oscilloscope screen when the time  base is switched off. The voltage gain is set to 0.25 V/div. Calculate the rms  current being tested if the resistance of the circuit is known to be 19 ohm. | **[CO4] [PO2]** |
| **31** | How a BJT can be used as a switch ? | **[CO4] [PO1]** |
| **32** | What is the upper and lower limit of a DC load line for a fixed bias circuit? | **[CO4] [PO1]** |
| **33** | What is Q-point ? | **[CO4] [PO1]** |
| **34** | A transistor is connected in CB configuration. When the emitter voltage is changed by 200mV, the emitter current changes by 5mA. During this variation, the collector to base voltage is kept fixed. Calculate the dynamic input resistance of transistor. | **[CO4] [PO2]** |
| **35** | What is Shockley’s Equation? | **[CO4] [PO1]** |
| **36** | Why a BJT is called as current controlled device. | **[CO4] [PO1]** |
| **37** | The amplification factor of an n-p-n transistor is 0.98, It is connected in the CB configuration and gives reverse saturation current (ICBO) is equal to 10Μa.Find the base and collector currents for an emitter of 2mA. | **[CO4] [PO2]** |
| **38** | What are the operating regions of a JFET? | **[CO4] [PO1]** |
| **39** | Find the relationship between α, β ? | **[CO4] [PO1]** |

**PART – C: (Long Answer Questions)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q.1** | | | | | |
| A | Draw the circuit diagram of a full wave bridge type rectifier using diode and explain its operation. Derive the expressions for rectificationefficiency and ripple factor, form factor and the transformer utilizationfactor. [5] | | 10 Marks | | **[CO4] [PO2]** |
| B | Draw the VI characteristic of a semiconductor diode. | | **[CO4] [PO2]** |
| **Q.2** | | | | |  |
| A | What is a semiconductor diode and Explain with suitable diagram about biasing of p-n Junction? [5] | | 10 Marks | | **[CO4] [PO2]** |
| B | Explain briefly about Center tapped type full wave rectifier and also discuss about the merits & demerits of it. [5] | | **[CO4] [PO2]** |
| **Q.3** | | | | |  |
| A | A silicon diode having 20 Ω internal resistance is used as half wave rectifier. If the applied input voltage is 50 sin 100 7πt and load resistance is 800 Ω, then find  (a) Im. Idc and Irms.  (b) Output frequency and ripple factor  (c)AC input and output power and efficiency. [5] | | 10 Marks | | **[CO4] [PO3]** |
| B | Consider the half-wave rectifier circuit shown in Figure 3 (a) below. If Vin is a triangle wave with a peak voltage of 2 V, and the diode has Vd = 0.5 V, sketch V out as a function of time on the plot of Vin shown in Figure 3 (a) below. Label the peak voltage of Vout. [5] | | **[CO4] [PO2]** |
| **Q.4** | | | | |  |
| A | For the circuit given in Figure 3 (b) below, draw the output wave form for the input as shown. Assume the diodes *to* be ideal.Given: VR1=2 V and VR2= 3 V. [5] | | 10 Marks | | **[CO4] [PO2]** |
| B | At room temperature, the diode in Figure 3(c) below has the modelparameters Is = 10-9 A and ɳ = 2. The de voltage source has the valueV1=2V. The source labelled V1 puts out a sinusoidal voltage and can beconsidered to be a small-signal source. For V1 = 0 V, solve for the value of R1 which biases the diode at ID = 2 mA. [5] | | **[CO4] [PO2]** |
| **Q.5** | | | | |  |
| A | Explain the operation and waveform of centre tapped full wave rectifier with suitable circuit diagram [5] | | 10 Marks | | **[CO4] [PO3]** |
| B | What is a semiconductor diode and Explain with suitable diagram about biasing of p-n Junction? [5] | | **[CO4] [PO1]** |
| **Q.6** | | | | |  |
| A | The load resistance of a center-tapped full wave rectifier is 500Ω and the necessary voltage (end to end) is 60sin (100∏t). Each diode has an internal resistance of 50 Ω.Calculate (i)peak ,average and rms values of the current  (ii)ripple factor  (iii)efficiency of the rectifier. [5] | | 10 Marks | | **[CO4] [PO2]** |
| B | Explain the operation and waveform of bridge rectifier with suitable circuit diagram [5] | | **[CO4] [PO1]** |
| **Q.7** | | | | | |
| A | What is the need of biasing in a transistor amplifier? Draw and explain the circuit of CE amplifier with input & output characteristics. Derive the expression for this configuration. [5] | 10 Marks | | **[CO4] [PO2]** | |
| B | Draw and explain the current-voltage characteristics of CB and CC BJT. [5] | **[CO4] [PO2]** | |
| **Q.8** | | | |  | |
| A | Compare between CE and CB BJT amplifiers. [5] | 10 Marks | | **[CO4] [PO2]** | |
| B | Draw the input and output V-I characteristics of CB, CC configuration? [5] | **[CO4] [PO2]** | |
| **Q.9** | | | |  | |
| A | Write the current equation for CB BJT and CE BJT and establish therelation between the two, taking the effect of the current ICO. [5] | 10 Marks | | **[CO4] [PO1]** | |
| B | Explain the input and output characteristics of transistor in CE configuration. [5] | **[CO4] [PO2]** | |
| **Q.10** | | | |  | |
| A | Write the short notes on Transistor act as an Amplifier? [5] | 10 Marks | | **[CO4] [PO1]** | |
| B | Determine the dc values of IB, IC,VCE,VE &VB.[10] if β= 100, Vcc=12 V, RB=Rc= 100 K. [5] | **[CO4] [PO2]** | |
| **Q.11** | | | |  | |
| A | What is active, saturation and cut-off region of a transistor? Explain with necessary diagram. [5] | 10 Marks | | **[CO4] [PO1]** | |
| B | Explain the comparison of CB, CC and CE transistor amplifiers. [5] | **[CO4] [PO2]** | |
| **Q.12** | | | |  | |
| A | Explain the CC configuration with input and output characteristics? [5] | 10 Marks | | **[CO4] [PO1]** | |
| B | How BJT acts as a switch and amplifier explain. [5] | **[CO4] [PO1]** | |

**UNIT-IV**

**PART – A: (Multiple Choice Questions)**

|  |  |  |
| --- | --- | --- |
| **1** | **In a CRO the time base signal is applied to**  (a) Vertical plate  (b) Horizontal plate  (c) Either vertical or horizontal plate  (d) Both horizontal and vertical plate  ANS-B | **[CO5] [PO1]** |
| **2** | **In a CRO the time base signal is applied to**  (a) Vertical plate  (b) Horizontal plate  (c) Either vertical or horizontal plate  (d) Both horizontal and vertical plate  ANS-B | **[CO5] [PO1]** |
| **3** | **Which part is called as heart of CRO?**   1. CRT 2. Sweep generator 3. Trigger circuit 4. Amplifier   **ANS-A** | **[CO5] [PO3]** |
| **4** | **Amplitude modulation is…………………..?**   1. Change in amplitude of the carrier according to modulating signal b. Change in frequency of the carrier according to modulating signal c. Change in amplitude of the modulating signal according to carrier signal d. Change in amplitude of the carrier according to modulating signal frequency   ANS-A | **[CO5] [PO1]** |
| **5** | **Typically, oscilloscope represents \_\_\_\_\_\_\_\_\_\_?**  a) current and time  b) resistance and time c) voltage and time  d) power and time  **ANS-C** | **[CO5] [PO1]** |
| **6** | **Given that (125)R = (203)5. The value of R is**  (a) 10  (b) 8  (c) 6  (d) 16  **ANS-C** | **[CO5] [PO1]** |
| **7** | **The decimal number 188 is equal to the binary number \_\_\_\_\_\_\_\_.**   1. 10111100 2. 0111000 3. 1100011 4. 1111000   **ANS-A** | **[CO6] [PO2]** |
| **8** | **The decimal equivalent of the binary number 100110102 is**   1. 154 2. 155 3. 153 4. 15   ANS-A | **[CO6] [PO2]** |
| **9** | **Convert the following binary number to decimal 100110112**  a) 154  b) 155  c) 156  d) 15  **ANS-B** | **[CO6] [PO2]** |
| **10** | **How many minimum numbers of NOR gates are required to implement EX-NOR gate?**  a) 4  b) 5  c) 3  d) 6  **ANS-C** | **[CO6] [PO3]** |
| **11** | **Which components are applicable for implementing a full adder.**  a) Two EX-OR, One OR and two NOT gate.  b) Two half adders and a NAND gate.  c) Two EX-OR gate, two AND gate & one OR gate  d) One EX-OR gate, two AND gate & two OR gate | **[CO6] [PO2]** |
| **12** | **In which function each term is known as min-term.**  a) SOP  b) POS  c) Both SOP & POS  d) Hybrid  **ANS-A** | **[CO6] [PO2]** |
| **13** | **How many AND, OR and EXOR gates are required for the configuration of full adder**  a) 2, 1, 2  b) 1, 2, 2  c) 3, 1, 2  d) 4, 0, 1  **ANS-A** | **[CO6] [PO2]** |
| **14** | **Each term in the standard SOP form is called as**  a) max term  b) don’t care  c) min term  d) truth table  **ANS-C** | **[CO6] [PO2]** |
| **15** | **The only function of NOT gate is to ……………..**  a) Stop signal  b) Invert input signal  c) Act as a universal gate  d) None of the above  **ANS-B** | **[CO6] [PO2]** |
| **16** | **In Boolean algebra, the bar sign (-) indicates ………………..**  a) OR operation  b) AND operation  c) NOT operation  d) None of the above  **ANS-C** | **[CO6] [PO2]** |
| **17** | **2’s complement of binary number 0101 is ………..**  a) 1011  b) 1111  c) 1101  d) 1110  ANS-C | **[CO6] [PO2]** |
| **18** | **An OR gate has 4 inputs. One input is high and the other three are low. The output is …….**  a) Low  b) High  c) alternately high and low  d) may be high or low depending on relative magnitude of inputs  **ANS-B** | **[CO6] [PO2]** |
| **19** | **In 2’s complement representation the number 11100101 represents the decimal number ……………**  a) +37  b) -31  c) +27  d) -27  **ANS-D** | **[CO6] [PO2]** |
| **20** | **The number of digits in octal system is ………**  a) 8  b) 7  c) 9  d) 10  **ANS-A** | **[CO6] [PO2]** |
| **21** | **A full adder can be made out of …………**  a) two half adders  b) two half adders and a OR gate  c) two half adders and a NOT gate  d) three half adders  **ANS-B** | **[CO6] [PO2]** |
| **22** | **The number of digits in Hexadecimal number system is ………**  a) 8  b) 16  c) 9  d) 10  ANS-B | **[CO6] [PO2]** |
| **23** | **In the expression A + BC, the total number of minterms will be ………**  a) 2  b) 3  c) 4  d) 5  **ANS-D** | **[CO6] [PO2]** |

**PART – B: (Short Answer Questions)**

|  |  |  |
| --- | --- | --- |
| **1** | What is a triggered sweep in CRO? | **[CO5] [PO2]** |
| **2** | Why a time base voltage is generally given to the horizontal plate of CRO? | **[CO5] [PO2]** |
| **3** | Why time-base is used in a Cathode Ray Oscilloscope? | **[CO5] [PO1]** |
| **4** | Define an analog signal with suitable example? | **[CO5] [PO2]** |
| **5** | What is a cathode ray oscilloscope (CRO)? | **[CO5] [PO1]** |
| **6** | Find the following binary 2’s compliment  101010001, 11001001 | **[CO6] [PO1]** |
| **7** | Implement the following logic function using NAND gates only  F = X ‘+ YZ | **[CO6] [PO2]** |
| **8** | Write the OR and AND identities. | **[CO6] [PO2]** |
| **9** | Write the truth table for a three-input XOR gate. | **[CO6] [PO1]** |
| **10** | Implement the logic circuit of the following expression  X = A’+BC by using NAND gate only.  Y= A’B +C by using NOR gate only. | **[CO6] [PO2]** |
| **11** | Add two numbers (- 7, + 18) in 2' complement notation. | **[CO6] [PO]** |
| **12** | (24 )R + (17)R = (40)R. Find the radix (R) so that the above statement is true. | **[CO6] [PO1]** |
| **13** | If F =A+ BC. Then prove F + F’ = 1 | **[CO6] [PO1]** |
| **14** | Convert (10.01 )10 to its equivalent binary number, | **[CO6] [PO1]** |
| **15** | Prove that: (i) X + X’Y = X + Y, (ii) AB+ A’B+ AB’ +(AB)’=1 | **[CO6] [PO2]** |
| **16** | What is the decimal equivalent of hexadecimal number (BAD)16? | **[CO6] [PO2]** |
| **17** | State De Morgan's theorem. | **[CO6] [PO2]** |
| **18** | State De Morgan's theorem of Boolean algebra. | **[CO6] [PO2]** |
| **19** | Which gates are called as the universal gates and What are its advantages? | **[CO6] [PO2]** |
| **20** | Convert the decimal number (29)10 to its binary equivalent. | **[CO6] [PO2]** |
| **21** | What is the circuit symbol of NAND gate? | **[CO6] [PO2]** |
| **22** | Draw the truth table of EXNOR logic operation. | **[CO6] [PO2]** |

**PART – C: (Long Answer Questions)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q.1** | | | |
| A | With the help of block diagram showing essential components explain the working of CRO. [5] | 10 Marks | **[CO5] [PO2]** |
| B | Draw the block diagram of function generator and explain its operation. [5] | **[CO5] [PO2]** |
| **Q.2** | | |  |
| A | Briefly explain about the block diagram of CRO. [5] | 10 Marks | **[CO5] [PO2]** |
| B | Draw and explain the signal generator. [5] | **[CO5] [PO2]** |
| **Q.3** | | | |
| A | State and prove De Morgan’s theorem of Boolean algebra. [5] | 10 Marks | **[CO6] [PO2]** |
| B | Which are the gates known as universal gate and why? Also verify the universal properties of NAND gate. [5] | **[CO6] [PO2]** |
| **Q.4** | | |  |
| A | Simplify the following Boolean expression and draw its logic circuit:  A'BC + AB'C' + A'B'C' + AB'C +ABC. [5] | 10 Marks | **[CO6] [PO2]** |
| B | Implement the following function using NOR gate only.  F (A,B,C,D) = (A+ C)(B + D). [5] | **[CO6] [PO2]** |
| **Q.5** | | |  |
| A | (i)Convert the the given number systems (BAD.537E)16 = (?)10  ,(DAD.25)10 = (?)2 [5] | 10 Marks | **[CO6] [PO2]** |
| B | Draw the logic diagram of given Boolean expression F = [A’B’ + (A.B)’] and Simplify the given Boolean expression and Draw the logic diagram of simplified expression? [5] | **[CO6] [PO2]** |
| **Q.6** | | | |
| A | Show that | 10 Marks | **[CO6] [PO1]** |
| B | Reduce the expression | **[CO6] [PO2]** |