Practice Questions Basic Electrical and Electronics Engg (Unit 1)

Q.No1.What is the necessity of earthing the electrical appliances? With a neat sketch explain a typical earthing system.

Q.No.2.The details of a domestic load and their operating schedule are as follows. Find the energy consumed during a month of 30 days. Calculate the energy bill for the month if the energy tariff per unit is Rs.5. and the fixed charge per month is Rs.100.(Ans:Energy consumed per month 241.8 kWh(units), Energy bill per month Rs.1309)

Load (appliance)	Number	Power rating(each)	Duration of operation in hours per day
Tube light	4	40 W	5
Fan	4	75 W	6
Fridge	1	300 W	4
Water heater	1	2 kW	2
LED bulbs	5	13 W	4

Q.No.3 For an alternating voltage v = 325.27sin(314t) volts find i)RMS voltage ii) Average voltage iii) frequency in Hz and time period iv)instantaneous voltage at t = 0.005 sec and at t=0.002sec v) time at which the instantaneous voltage is 200 V.
        (Ans:230V,206.87V,50 Hz, 0.02sec,325.27Vand 191.10V, 2.108msec)

Q.No.4.Explain voltage and current in purely inductive circuit. Show that the energy consumed by a pure inductance is zero.

Q.No 5.Derive an expression for the average power consumed by a single phase R-L series circuit. Show the wave forms for voltage, current and power.

Q.No 6.A solenoid coil has a resistance of 2 Ω and inductance of 5 mH with a supply voltage of single phase 230 V, 50 Hz. Find   i)impedence ii) current iii) power factor iv) power consumed and v) reactive power(Ans:2.5426/_38.13 Ω,90.55/_-38.13 A, 0.7866,460W,361VAR)

Q.No 7.A single phase 250 V, 50 Hz AC circuit takes a current of 2$\angle$450 A .Find the parameters in the circuit and power consumed .(Ans: leading current means R & CZ=125/_-45 Ω, R=88.38 Ω, Xc=88.38 Ω, C=36μF)

Q.No 8   An alternating current varying sinusoidal with a frequency of 50 Hz has RMS value of 20 A. Find the Max.value,Time period, instantaneous current at 0.005 sec and 0.015 sec. Find the time at which the current attain 14.14 A. (Ans:28.28A,0.02sec,28.28 A,-28.28A,1.66msec)

Q.No9 Find the impedence, current, p.f., power consumed, active and reactive power in a R L C series circuit with single phase, 230 V, 50 Hz supply with resistance 5Ω, inductance 0.02 H, capacitance 150µF. Draw phasor diagram.(Ans:XL=6.28 Ω, XC=21.22 Ω,Z=15.75/_-71.49 Ω,14.60/_71.49A, pf 0.3174(lead),1065.82 W, 3184.28 VAR)

Q.No 10 An inductor takes 2 A consuming 400 W power in a 250 V, 50 Hz single phase circuit. Find the parameters of the inductor.(Ans:Z=125 Ω, cosφ=0.8,R=100 Ω, XL=75 Ω, L=0.238H)

Q.No 11 A sinusoidal voltage 80+j60 V is applied to a circuit and the current is -4+j10 A. Find

i) impedance of the circuit   ii)power factor   iii) power consumed .Show the voltage and current phasors.(Ans:9.28/_-74.93 Ω, p.f.0.26, 280 W)

Q.No 12.Find the circuit parameters if the applied voltage is v= !00sin(314t) V and the current is

i=100sin(314t-30)A. Draw voltage and current phasors   (R=8.77Ω, L=5H)

Q.No 13 Find total impedence &currents in all the branches if supply voltage is 200 V, 50 Hz

$Z_1\ 4+j6Ω$ $Z_2\ 10-j12$

$Z_3\ 6+j10\ Ω$
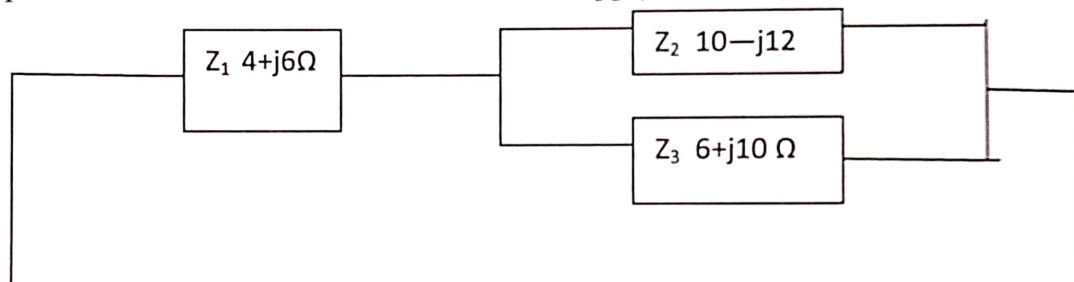
(Ans:17.5/_31.4 Ω, I1=11.4/_-31.4, I2=8.26/_34.7, I3=11/_-74.5A)

Practice Questions (Basic Electrical and Electronics Engg. (Unit 2))

Q.No 1 Mention the types of 3 phase Synchronous generators and explain with neat diagram the construction of any one type.

Q.No 2..Derive an expression for emf per phase in a 3 phase Synchronous generator. What are the advantages of stationary armature ?

Q.No 3 A 3 phase, 500 kVA, 16 pole, 375 rpm   star connected Synchronous generator has 192 stator slots with 8 conductors each. Flux per pole is 55 mWb. Distribution factor is 0.98 and pitch factor is 0.96. Find the emf per phase and the line emf induced.(Ans: 2948 V, 5106 V)

Q.No 3 A 3 phase, 25 kVA, 6.6 kV, 4 pole, 1500 rpm   star connected Synchronous generator has 60 stator slots with 2 conductors each. Distribution factor is 1 and pitch factor is 0.96. Find flux per pole . (Ans: 0.943 Wb, Take 6.6 kV in volts as 6600 V line voltage)

Q.No.4 Derive the relations between phase voltage and line voltage, phase current and line current in 3 phase star connected and delta connected systems. What is meant by phase sequence?

Q.No 5. In a 3 phase 415 V, 50 Hz system has 3 load impedances, each consisting of 5 Ω resistance and 20 mH. Find load impedance per phase, phase current, line current, the power consumed, reactive power in each case when load is connected in i) star and in ii) delta.. Which connection is more advantageous?.(Ans:5+j6.28 =8.027/_51.47 Ω, i)29.84 A, 29.84 A,13.361 kW,16.779 kVAR   ii)51.70A, 89.54A, 40 kW, 50.31 kVAR)

Q.No 6.Show that 3 phase power can be measured using 2 Watt meters using near circuit diagram and phasor diagram.

Q. No 7..Find the two wattmeter readings in a 3 phase, 50 Hz, 440 V star connected system with impedence/phase of 3+j4 Ω. Using the wattmeter readings find the 3 phase power consumed, reactive power and power factor in the circuit.(Ans:W1=19389W, W2=2674 W,23229 W,30971 VAR,0.60)

Q.No 8 A 3 phase, 415 V, 50 Hz Squirrel cage Induction motor is operating at 85 percent efficiency. The two watt meters connected read as W1=5000 W and W2= -1500 W.Using the wattmeter readings find i)Input power   ii)power factor   iii)reactive power   iv)output power.

(Ans:3500 W,0.2968,11258 VAR, 2975 W)

Q. No 9..Find the two wattmeter readings in a 3 phase, 50 Hz, 440 V star connected system with resistance/phase of 10 Ω. Using the wattmeter readings find the 3 phase power consumed, reactive power and power factor in the circuit.(Ans:W1=9678W, W2=9678W, 19357 W, 0 VAR, p.f. is 1)

Practice Questions (Basic Electrical and Electronics Engg. (Unit3)

Q.No 1.A single phase 50 Hz , 10 kVA transformer has a rated primary voltage of 230 V.Flux density in the core is 0.45 Wb/m2 and area of cross section 50cm2 cm.The voltage transformation ratio is 4/23 .Find i) the no.of turns in primary winding and secondary winding ii) secondary terminal voltage.If voltage regulation at full load is 5% find secondary terminal voltage at full load..(Ans:460 and 80 turns, 40V, 38V)

Q.No.2 A single phase 50 Hz , 30 kVA, 3300/300V transformer has maximum Flux of 0.06 Wb in the core. .Find i) the no.of turns in primary winding and secondary winding ii) The voltage transformation ratio iii) the rated primary and secondary current. (Ans:264 and 24, 1/11, 100A and 9.09A)

Q.No 2.Derive EMF equation for a Single phase transformer and define Voltage transformation ratio and voltage ratio and turns ratio.

Q.No 3.For a 50 kVA ,2000 V/230 V, 50 Hz, Single phase transformer Full load copper loss is 800 W and Iron loss is 400 W.Find % efficiency at i) Full load and 0.8 pf lag ii) Half load and unity pf lag. If the secondary terminal voltage is 210 V at full load find % voltage regulation.(Ans:97.08%, 97.65%, 0.086)

Q.No 4.For a 300 kVA ,2000 V/230 V, 50 Hz, Single phase transformer has % efficiency of 97.8 at Full load and 0.8 pf lag and % efficiency of 98.4 at Half load and unity pf lag. Find %efficiency at 80% load and 0.8 p.f.(Ans:97.95%) Note: First find Full load Copper loss and Iron loss and then proceed.

Q.No 5. Explain with neat diagrams construction of different types of transformers.

Q.No 6 Explain with neat diagrams the principle of operation and working of a 3 phase induction motor.(Here do not explain the production of rotating magnetic flux in stator)

Q.No 7 Explain how a rotating magnetic flux is produced in the stator of a 3 phase Induction motor.

Q.No 8 Define and explain slip in 3 phase Induction motor. What is the value of slip at starting? What happens to slip when load on the Induction motor is increased?

Q.No 9 A 5 HP,415 V, 50 Hz, 4 pole, 3 phase squirrel cage Induction motor is operating at full load at 1440 rpm. Find the % slip at full load and the frequency of rotor emf. Find the speed if the slip is 2 %. (Ans:4%, 2 Hz, 1470 rpm)

Q.No 10. A 10 HP,415 V, 50 Hz, 6 pole, 3 phase squirrel cage Induction motor is operating with the frequency of rotor emf as 2 Hz. Find the rotor speed. If the rotor attains the synchronous speed what will be the frequency of rotor emf? (Ans:Slip 4%, Rotor speed N=960 rpm, 0 Hz)

Q.No 11 With neat diagrams explain the construction of Squirrel Cage IM and Slip ring IM.

Q.No 12.With reasoning explain the applications of Squirrel Cage IM and Slip ring IM.

Q.No 13.Explain the necessity of starter in 3 phase Induction motor. With neat sketch explain Star Delta starter used for 3 phase Induction motor. Which connection is used the stator winding during normal operation and explain the reason?

Q.No 14 Explain comparison of Squirrel cage Induction motor and Slip ring Induction motor.

Q.No 15 Discuss the advantages and disadvantages of Squirrel cage Induction motor and Slip ring Induction motor.

Practice Questions (Basic Electrical and Electronics Engg. (Unit 4)

Q.No 1. What is a diode rectifier circuit? Mention the types of PN junction diode rectifiers.

Q.No 2.Explain with a neat circuit diagram the working of Half wave rectifier. Show the input and output waveforms. Derive the values of efficiency and ripple factor.

Q.No 3. Explain with a neat circuit diagram the working of Full wave bridge rectifier. Draw the input and output waveforms. Derive the values of efficiency and ripple factor.

Q.No 4.In a HWR with 230/80V transformer if the load resistance is RL =20Ω find i)O/P DC voltage   ii)the PIV   iii)DCcurrent   iv) efficiency v) ripple factor. Assume ideal diode(i.e.ignore forward resistance).

Q.No 5.In a Full Wave bridge rectifier with 230/24 V transformer if the load resistance is R_L =100Ω find i)O/P DC voltage   ii)the PIV   iii)DCcurrent   iv) efficiency v) ripple factor. Assume ideal diodes.

Q.No 6.Explain in brief the construction of a Bipolar Junction Transistor. Mention the types of BJT and write their symbols.

Q.No 7.Summarise the comparison of the three configurations of BJT.

Q.No 8.Explain the three operating modes of a Transistor(consider CE configuration) and indicate those on output characteristics.

Q.No 9.Explain with a diagram how BJT (NPN) is used as a switch.

Q.No 10.Explain a neat diagram how a transistor used as amplifier.

Q.No.11 Explain with a neat circuit diagram a RC coupled Common emitter Amplifier mentioning the function of each component.

Q.No 12 Mention the parameters and characteristics of a Transistor amplifier(Voltage gain, Current gain, Band width, Input and Output impedance, Slew rate, Stability, Linearity).

Q.No 13 Explain the applications of RC coupled Common emitter Amplifier.

Q.No 14 Explain the merits and demerits of RC coupled Common emitter Amplifier.

Q.No 15 Explain the principle of working of an Oscillator.(i.e Barkhausen Criterion with block diagram)

Q.No 16 Explain the working of RC phase shift oscillator with neat circuit diagram.

Practice Questions (Basic Electrical and Electronics Engg. (Unit 5)

Q.No.1 What is an Operational Amplifier? Explain the concept of OPAMP with the block diagram.

Q.No.2 Briefly explain the Differential Amplifier. Mention the characteristics of an Ideal OPAMP.

Q.No 3.Derive the expression for Voltage gain for Inverting and Non Inverting OPAMP amplifiers with neat circuit diagrams.

Q.No.4.Mention any four applications of 741 OPAMP.

Q.No 5 Write the pin configuration 741 OPAMP IC.

Q.No 6 Explain with neat circuit diagram i) Summing circuit ii) Subtracting circuit using OPAMP.

Q.No.7 Explain with neat circuit diagram Zero crossing detector using OPAMP.

Q.No.8 Mention the advantages and disadvantages of Digital electronics.

Q.No.9 Convert the binary numbers to decimal i)$(11110)_2$ ii)$(1011)_2$ (Ans:$(30)_{10}$, $(11)_{10}$)

Q.No.10 Convert the decimal numbers to binary i)$(127)_{10}$ ii)$(38)_{10}$ Ans:$(1111111)_2$, $(100110)_2$

Q.No.11 Write the laws of Boolean Algebra. Briefly explain the use of the laws.

Q.No.12 Name the basic logic gates and write the truth tables.

Q.No.13 What do you mean by logic circuits ?Name any four logic circuits.

Q.No.14 Write the logic circuits for the following Boolean expressions.

a) $\bar{A}.B + C.D + A.\bar{C}$ b) $(\bar{A} + B).(C+D).(A+\overline{C})$

Q.No.15 Explain Half adder circuit with truth table.

Q.No.16 Explain Full adder with truth table.