Roll No: ----------

UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B.Tech(APEU,CIVIL,FSE, ADE, Mech, MechE, GSE, GIE, Mining) **Semester – I**

Subject (Course): Basic Electrical and Electronics Engineering **Max. Marks : 100**

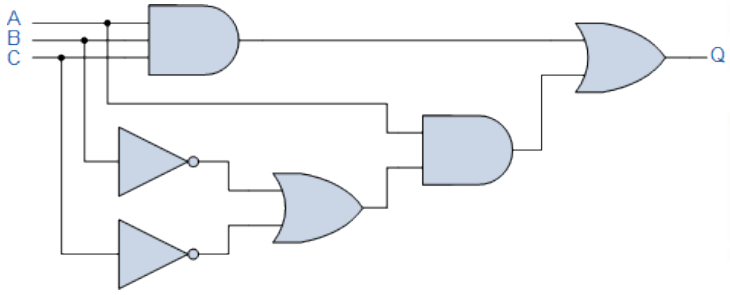
Course Code :ECEG1001 **Duration : 3 Hrs**

No. of page/s:2

Section –A

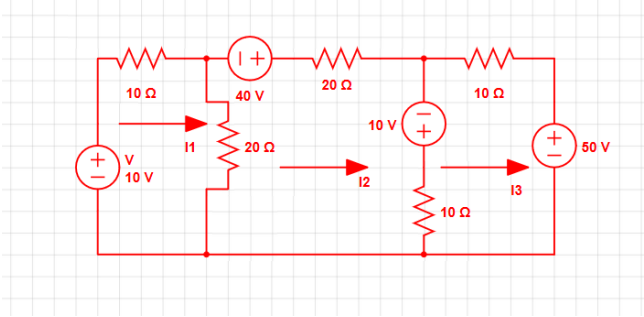
Note: Answer all of the following **5x4=20 Marks**

1. For the logic diagram given below find the final output logical expression and write the truth table?



2. What is PN-junction Diode? Discuss the behavior of a PN junction under forward and reverse biasing and also sketch V-I characteristics of a PN Junction.

3. Find I_1,I_2, & I_3 in the network given below using loop-current method



4. When a 100 kVA single-phase transformer was tested the following results were obtained: On open circuit the power consumed was 1300 W and on short circuit at full load current the power consumed was 1200 W. Calculate the efficiency of transformer on full load and half load when working at unity power factor.

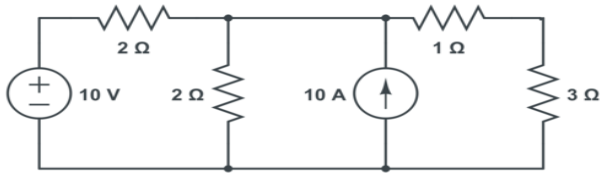
Section –B

Note: Answer all of the following **10x4=40 Marks**

5. Compare CE and CB configurations for their various parameters (preferably in a tabular form). Also, explain why CE configuration is widely used in amplifier circuit. Draw input and output characteristics of the CE- configuration with proper operating regions.

6. For a particular NPN transistor with Emitter bias V_{BE} = 0.7 V and β =100, R_B= 430 KΩ, R_C= 2KΩ, R_E=1 KΩ, V_{BB}= 10 V, V_{CC}= 20 V find I_B, I_C and V_{CE}

7. (i) Determine the current through 3 Ω resistance shown in fig below using Thevenin's theorem. Also find maximum power to be transferred.



(ii) A coil having an inductance of 25mH and negligible resistance in series with a 15ohm resistor is connected across a 240V, 50Hz Supply. Calculate the impedance, admittance, the phase angle between the current & applied voltage, power factor, the apparent power & the active power.

8. Discuss the phenomenon of Electromagnetic Induction. Also discuss statically induced emf & dynamically induced emf.

Section –C

Note: Answer all of the following **20x2=40 Marks**

9. (i) Design a Bridge rectifier circuit for which V_{rms} is given as 81.3 V with turn's ratio 10:1. Find the DC output Voltage V_{DC}, Maximum Value of AC input V_m, Primary & secondary Voltages of Transformer V_1 & V_2 and Ripple factor.

(ii) Implement a Full adder by using two Half adders and realize the Sum and C_{out} outputs by using NAND gates.

10. (i)With a neat sketch explain phasor diagram of a single phase transformer for a lagging power factor load.

(ii) a. Derive the emf equation of D.C. generator.

b. A 4-pole generator with wave wound armature has 51 slots each having 48 conductors. The flux per pole is 7.5 mWb. At what speed must the armature be driven to give an induced e.m.f of 440V.

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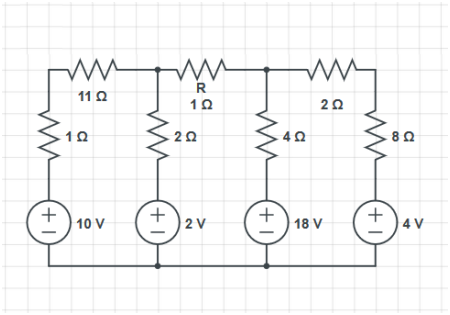
Section –A

Note: Answer all of the following **5x4=20 Marks**

1. Compare between Half Wave, Full Wave and Bridge Rectifiers
2. Convert the following
   i. $(F67.5A)_{16} = (\quad)_8$
   ii. $(101011.1001)_2 = (\quad)_{10}$
   iii. $(9309.124)_{10} = (\quad)_{16}$
   iv. $(101011)_8 = (\quad)_2$
   v. $(679)_8 = (\quad)_{10}$

3. Find current through R using Thevenins theorem & hence draw Thevenin's equivalent circuit



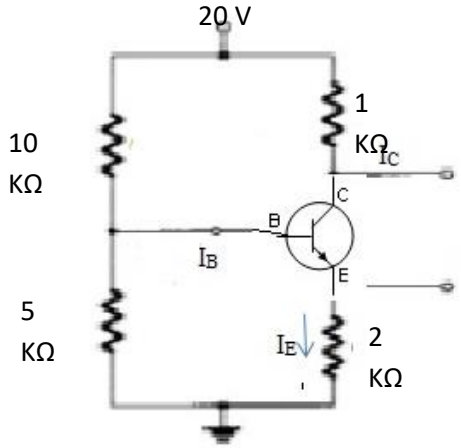
4. Define Lenz's law. Also brief Magnetic flux density & Magnetic field intensity.

Section –B

Note: Answer all of the following **10x4=40 Marks**

5. Write the step by step process of implementing a Boolean function by using NOR gates and implement $Y = A + (B + C).(\bar{B}$ + A) by using NOR gates after minimizing using Boolean laws.

6. Analyze the following circuit and calculate V_{th}, R_{th}, I_B, I_C, V_{CE}



7. (i) A balanced star connected load of (8+j6) ohm per phase is connected to a balanced 3-phase, 400V supply. Find the line current, power factor, Active power & total volt amperes.

   (ii) A coil having a resistance of 4ohm & inductance of 0.04H is connected across a 100V,50Hz Supply. Calculate the current, the phase angle between the current & applied voltage, the apparent power & the active power.

8. Discuss Flemings' Right hand rule & hence use this rule to determine the direction of current getting induced in the DC generator with the working principle.

Section –C

Note: Answer all of the following **10x4=40 Marks**

9. (i) Design a fixed bias circuit for a CE-amplifier such that V_{CE} = 8V and I_C = 2 mA. You are supplied with +15 V DC-supply as input for V_{BB} and V_{CC} and a silicon transistor with β = 100. Calculate the value of R_B and Rc. Consider V_{BE}=0.6V.

   (ii) Design a Bridge rectifier circuit for which V_{rms} is given as 81.3 V with turn's ratio 10:1. Find the DC output Voltage V_{DC}, Maximum Value of AC input V_m, Primary & secondary Voltages of Transformer V_1 & V_2 and Ripple factor.

10. (i) Derive emf equation of a Single phase transformer & hence comment on turns ratio.

(ii) A 100 kVA, 6600/440 V, 50 Hz single-phase transformer has 80 turns on the low-voltage winding.

(a) Calculate the maximum flux in the core
(b) The number of turns on high voltage winding
(c) The current in each winding

(iii) The armature of a 4-pole DC generator is required to generate an emf of 520 V on open circuit when revolving at a speed of 660 rpm. Calculate the magnetic flux per pole required if the armature has 144 slots with 2 coils per slot, each coil consisting of three turns. The armature is wave wound.

(iv) A 5 kVA, 1000/200 V, 50 Hz single-phase transformer gave the following test results:
Open circuit test (L.V side): 200 V, 1.2 A, 90 W
Short circuit test (H.V. side): 50 V, 5 A, 110 W
Calculate the efficiency of transformer on half load at unity power factor.

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