Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination[C]
July, 2017

Level : B.E.
Year : II

Course : EEEG 204
Semester : I

Exam Roll No. :

Time :30 mins.

F. M. : 20

Registration No. :

Date JUL : 1 1 2017

SECTION "A"
[20 Q. × 1 = 20 marks]

Choose the most appropriate option.

1. In reverse blocking mode of thyristor junction .....are forward biased whereas junction .....is reverse biased.
   a) J_1 and J_2; J_3 b) J_2 and J_3; J_1 c) J_1; J_2 and J_3 d) J_1 and J_3; J_2

2. Typical value of ionization energy of an electron for an N-type semiconductor can be about
   a) 0.15 eV b) 0.01 eV c) 1.1 eV d) 0.1 eV

3. At which temperature the number of electrons is equal to number of holes in an intrinsic semiconductor?
   a) 0 K b) 0 ^{O}C c) 273 K d) 15 ^{O}C

4. Ripple frequency of the output waveform of a full-wave rectifier when fed with a 50 Hz sine wave is.....
   a) 25 Hz b) 150 Hz c) 100 Hz d) 105 Hz

5. For an NPN bipolar transistor, what is the main stream of current in the base region?
   a) drift of holes b) diffusion of holes
   c) drift of electrons d) diffusion of electrons

6. The action of a JFET in its equivalent circuit can best be represented as a
   a) current controlled current source b) current controlled voltage source
   c) voltage controlled voltage source d) voltage controlled current source

7. A FET is better chopper than a BJT because it has
   a) lower off-set voltage b) higher series ON resistance
   c) lower input current d) higher input impedance

8. An LED made using GaAs emits radiation in
   a) visible region b) ultraviolet region
   c) infrared region d) microwave region

9. Which semiconductor power device ,out of the following is not a current triggered device ?
   a) thyristor b) TRIAC c) MOSFET d) GTO

10. Once SCR is turned on, it remains so until the anode current goes below
    a) trigger current b) break over current
    c) threshold current d) holding current

11. How many bits will a D/A converter use so that its full-scale output voltage is 5V and its resolution is at the most 10 mV?
a) 5 b) 7 c) 9 d) 11

12. A 8 bit converter is used for a dc range of 0-10 V. Find the weight of LSB.
a) 39 mV b)78 mV c) 42 mV d) 54 mV

13. In saturation region of CE transistor, V_{CE} is .....
a) high b) small c) very small d) very high

14. Repulsion type moving–iron instrument consists of two cylindrical soft iron vanes mounted within a fixed.....
a) current-carrying coil b) voltage coil
c) magnet d) core

15. In wattmeter, current and voltage may not be in phase for ac power, owing to the .....effects of circuit inductance or capacitance.
a) discharging b) charging c) reactive d) delaying

16. In energy meter the field of the voltage coil is delayed by 90 degrees, due to the coil's inductive nature, and calibrated using a.....
a) lead coil b) lag coil c) capacitor in series d) capacitor in parallel

17. Shunt is made of .....depending upon whether it is used for DC or AC.
a) manganin or constantan b) magnese or nickel alloy
c) nickel or manganin d) magnese or constantan

18. The collector and base current of an NPN transistor are measured as I_C=5 mA ,I_B=50 μA and I_{CBO}=1 μA.Determine the new level of I_B required to produce I_C =10 mA.
a) 98.6 μA b) 12.5 μA c) 13.8 μA d) 101 μA

19. When the drain-source voltage is changed by 1.5 volts, the change in drain current is of 120 μA, the gate-source voltage remaining unchanged. Determine the ac drain resistance of the JFET.
a) 10.5 kΩ b)11.5 kΩ c) 12.3 kΩ d)12.5 kΩ

20. In a JFET the drain current changes from 1.2 mA to 1.5 mA when the gate to source voltage is varied from -4.25 V to -4.10 V. Keeping the drain-source voltage constant. Determine the trans-conductance for the given JFET.
a) 5 m A/V b) 2 m A/V c)10 m A/V d)1.8 m A/V

KATHMANDU UNIVERSITY
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Time : 2 hrs. 30 mins.

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Semester : I
F. M. : 55

SECTION "B"
[5 Q. × 11 = 55 marks]

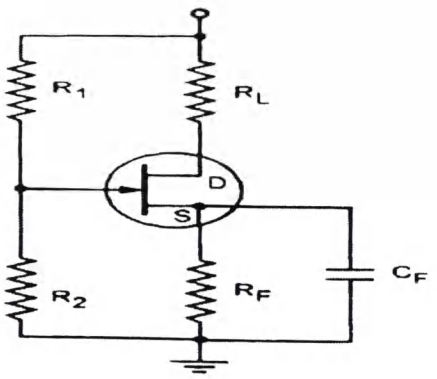
Attempt ANY FIVE questions.

1. a. A full-wave bridge rectifier with 120 V_{rms} sinusoidal input has a load resistor of 1kΩ [5]

   i) If silicon diodes are applied, what is dc voltage available at load?
   ii) Determine required PIV rating of each diode.
   iii) Find maximum current through each diode during conduction.
   iv) What is required power rating of each diode?

   b. Explain PN-junction under different biasing conditions with figure. [6]

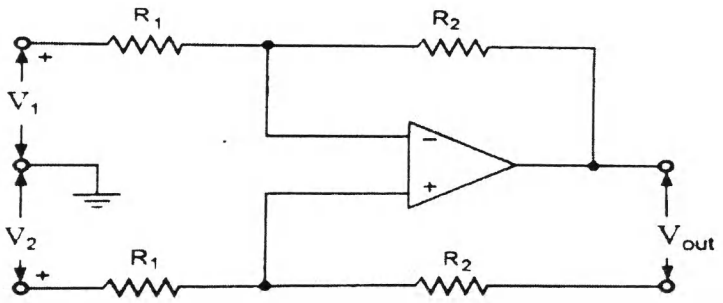
2. a. JFET acts as an amplifier. Justify this statement. [4]
   b. A JFET amplifier with stabilized biasing circuit shown below has device parameters: [4]
   V_P=-2 V, I_{DSS}=5 mA , R_L=910 Ω ;R_F=2.29 kΩ, R_1=12 MΩ, R_2=8.57 MΩ and V_{DD}=24 V.
   Find the value of drain current I_D at the operating point. Also verify that FET operate in pinch-off region.



   c. A transistor is connected in common emitter configuration .Collector supply voltage V_{CC} is 10 V ,load resistance R_L is 800 Ω, voltage drop across R_L is 0.8 V and current gain α=0.96. Determine $V_{CE}$and I_B. [3]

3. a. Explain the three basic modes of operation of thyristor in brief. [6]
   b. Differentiate the principle of moving coil and moving iron instrument with figure. [5]

4. a. Derive the relation of voltage gain and feedback resistance for inverting and non-inverting op-amp with figure. [6]
   b. The differential input op-amp,shown below consists of a base amplifier of infinite gain. Show that $V_{OUT}=R_2/R_1(V_2-V_1)$. [5]



5. a. Convert $(110011)_2$ using binary weighted and R-2R DAC. [5]
   b. Find the successive approximation ADC output for a 4- bit converter to a 3.217 V input if the reference is 5 V. [3]
   c. Point out the similarities and differences between Resistance thermometer and thermistor. [3]

6. a. A linear resistance potentiometer is 50 mm long and is uniformly wound with a wire of total resistance 5000 Ω. Under normal conditions, the slider is at the center of the potentiometer. Determine the linear displacement when the resistance of the potentiometer, as measured by the wheat stone bridge is 1850 Ω. [4]
   b. Write short notes on: [3.5 × 2 =7]
      i) Energy meter
      ii) Strain gauge