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F.Y B.Sc. (Computer Science) EXAMINATION, 2018

ELECTRONIC SCIENCE

Paper I

(ELE-101 : Principles of Analog Electronics)

(2013 PATTERN)

Time : Three Hours

Maximum Marks : 80

N.B. :— (i) All questions are compulsory.

(ii) Neat diagrams must be drawn wherever necessary.

(iii) Figures to the right indicate full marks.

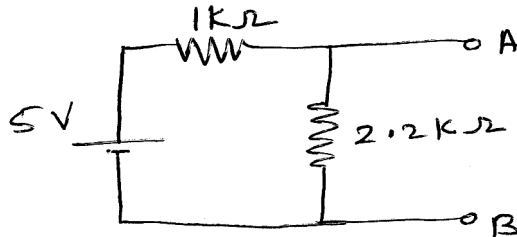
1. Attempt all of the following :

[8×2=16]

(a) State working principle of transformer.

(b) Draw symbols for photodiode and varactor diode.

(c) Calculate voltage drop across 2.2 kΩ resistor :

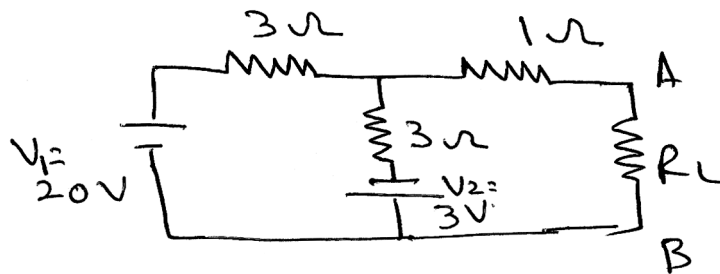


P.T.O.

- (d) Define Q point and list the factors affecting stability of the transistor.
- (e) Give sign conventions for Kirchhoff's voltage law.
- (f) Draw output I-V characteristics of BJT in CE mode and show all regions in it.
- (g) In JFET circuit drain current changes by 20 mA, when V_{GS} changes by 2 V at a constant drain source voltage. Calculate drain resistance.
- (h) Define the terms differential mode gain and common mode gain of an op-amp.

2. Attempt any *four* of the following : [4×4=16]

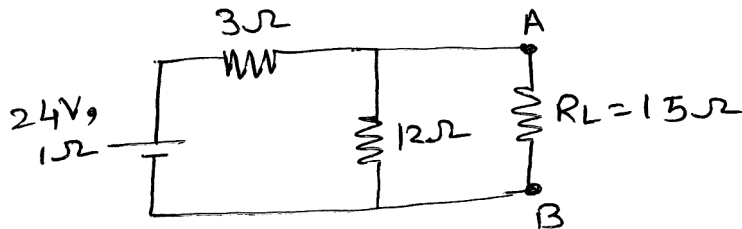
- (a) Explain the classification of capacitors.
- (b) Find the value of R_L for which maximum power will be transferred for the following circuit :



- (c) With the help of a neat circuit diagram explain the action of Zener diode as a regulator.
- (d) Explain the frequency response for a single stage R.C. coupled amplifier.
- (e) Explain the working of n-channel JFET with suitable diagram.
- (f) Explain the action of Schmitt trigger using operational amplifier.

3. Attempt any *four* of the following : [4×4=16]

- (a) Define the following parameters related to operational amplifiers :
 - (i) Output impedance
 - (ii) PSRR
 - (iii) Output offset voltage
 - (iv) Input bias current.
- (b) Explain the working of MOSFET as a switch.
- (c) Distinguish between JFET and BJT.
- (d) Explain the working principle of optocoupler.
- (e) Calculate current through load resistor $15\ \Omega$ by using Thevenin's theorem :

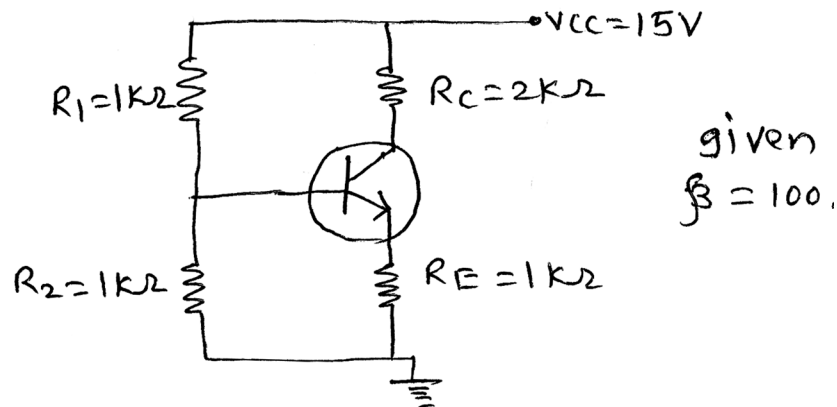


- (f) Explain SPDT and push to ON switch in detail.

4. Attempt any *four* of the following :

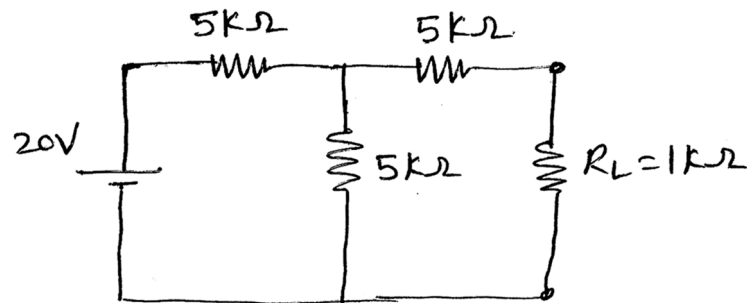
[4×4=16]

- (a) Calculate coordinates of d.c. loadline for a silicon transistor in a circuit :



- (b) Define intrinsic stand-off ratio for UJT. Calculate intrinsic stand-off ratio if $R_{B1} = 6 \text{ k}\Omega$, $R_{B2} = 4 \text{ k}\Omega$.
- (c) Explain the concept of virtual ground in an op-amp.
- (d) State the application of the following types of transformers :
- (i) Step-up
 - (ii) Step-down
 - (iii) Isolation
 - (iv) Centre tapped.

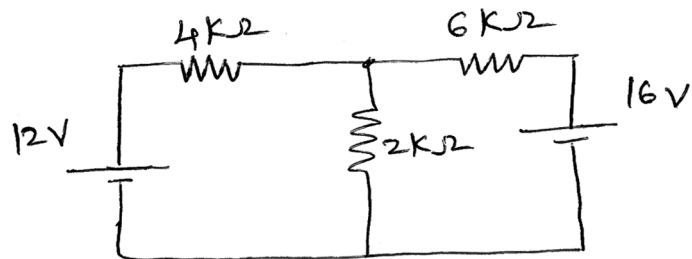
(e) Draw Norton's equivalent circuit for the following circuit :



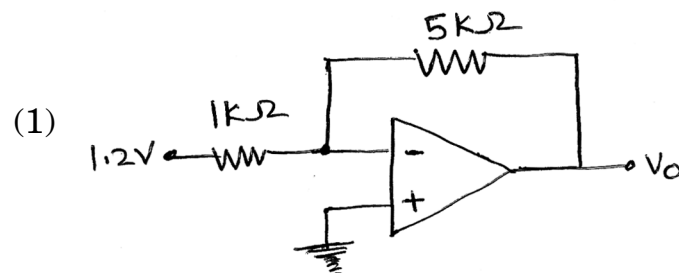
(f) Explain the working of series dipper.

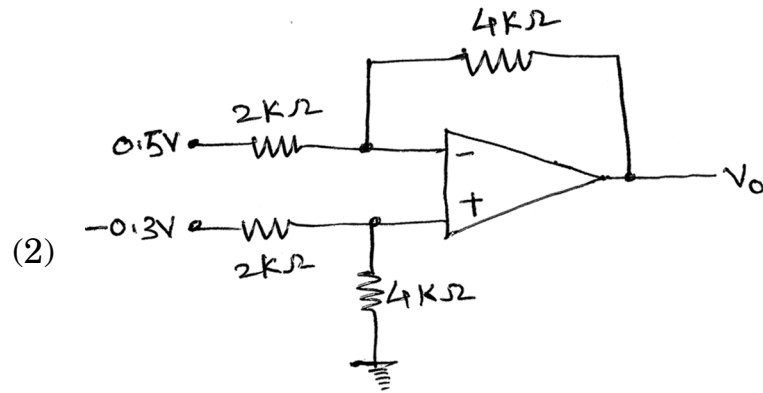
5. Attempt any *two* of the following : [2×8=16]

- (a) (i) Explain working principle of optical fibre cable.
 (ii) Calculate current through 2 kΩ resistor using Kirchoff's laws :



- (b) (i) Distinguish between CB, CE and CC configurations of transistor.
 (ii) Recognize the application of op-amp and find output voltage for the following circuits :





- (c) (i) Define α and β for transistor. Derive the relation between α and β .
- (ii) Derive the expression for discharging current of a capacitor and plot the graph of discharging current *versus* time.