



# RAN-1153

## BSC(Physics) Sem-VI Examination

March / April - 2019

### ID-CAN-Electronics (Generic elective)

Time: 2 Hours ]

[ Total Marks: 50

#### સૂચના : / Instructions

1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.  
Fill up strictly the details of signs on your answer book

Name of the Examination:

BSC(Physics) Sem-VI

Name of the Subject :

ID-CAN-Electronics (Generic elective)

Subject Code No.: 1 1 5 3

Seat No.:

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Student's Signature

- 2) Draw neat diagram wherever necessary.
- 3) Symbols used in the question paper have their usual meaning.
- 4) Figures to the right indicate full marks of the question.
- 5) Scientific calculator may be used.

#### Q-1 Answer the question in short.

(8)

- 1) Define Unity Buffer.
- 2) What is input bias current?
- 3) What are types of class of the amplifiers?
- 4) Draw the symbol of Tunnel diode.
- 5) Define solar cell and thermister of semi conductor device.
- 6) Draw the block diagram of a feedback network.
- 7) If  $c_1=75\mu\text{F}$  and  $c_2=750\text{ nf}$ , what is the value of  $A_f$  and  $\beta$  ?
- 8) Draw the circuit diagram of colpits oscillator using OP-AMP.

- Q-2 (A) Answer any one of the following in details (10)**
- 1) Explain the “OP-AMP basics”. Derive expression for the voltage gain for inverting amplifier.
  - 2) Explain offset voltages in OP-AMP .Derive the expression for the output voltage  $V_{O(\text{offset})}$  for a specific input voltage  $V_{IO}$  for OP-AMP.
- (B) Answer any one of the following in details (4)**
- 1) Determine the output voltage of an OP-AMP for input voltages of  $V_{i1}=150\mu\text{V}$  and  $V_{i2}=140\mu\text{V}$ . The amplifier has a differential gain of  $A_d=4000$ . Calculate voltage for CMRR of (i)  $10^2$  (ii)  $10^4$
  - 2) Explain differential and common mode operation amplifier.
- Q-3 (A) Answer any one of the following in details (10)**
- 1) What is amplitude and harmonic distortion? Derive an equation for second harmonic distortion.
  - 2) Explain the construction and working of SCR. Also draw and explain the I-V characteristic of SCR.
- (B) Answer any one of the following in details (4)**
- 1) Explain in detail ‘Solar Cell’
  - 2) For UJT for  $V_{BB}=12\text{V}$ ,  $\eta=0.65$ ,  $R_{B1}=2.2\text{k}\Omega$  ( $I_E=0$ ) and  $V_D=0.7\text{V}$ , determine  $R_{B2}$ ,  $R_{BB}$ ,  $V_p$ .
- Q-4 (A) Answer any one of the following in details (10)**
- 1) Draw the transistorise circuit diagram of a Colpitts oscillator and explain its action. Obtain the equation to calculate frequency and condition of oscillation.
  - 2) What is concept of feedback? Obtain an equation for gain, output and input impedance with feedback in case of voltage series feedback amplifier.
- (B) Answer any one of the following in details (4)**
- 1) In Colpitts oscillator for  $C_1=250\text{pF}$ ,  $C_2=375\text{pF}$ ,  $L=37\mu\text{H}$  calculate the frequency of oscillation.
  - 2) What are four possible topologies of a feedback amplifier? Draw block diagrams of all feedback amplifier configurations showing output and feedback signal.