Th2   ANALOG ELECTRONICS AND OPAMP

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

2 x 10

1.   Answer **All** questions.
   a.   Define knee voltage of a PN junction diode. Write the values of cut in voltage for Si and Ge diode.
   b.   What is the role of intrinsic (I) layer in a PIN diode?
   c.   Define ripple factor and mention its values for Half Wave and Full Wave rectifier.
   d.   Draw the transistor configurations for CB, CE.
   e.   What are the needs for transistor biasing?
   f.   Write the advantages of negative feedback in amplifier.
   g.   Differentiate between BJT and FET.
   h.   Define CMRR and Slew Rate of an OPAMP.
   i.   If $V_i = -10V$, then find V_0 .
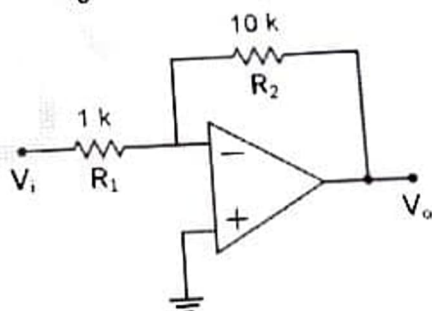
   j.   Draw the simplified circuit diagram of a series clipper. Plot its output waveform for an input $v_i(t) = 5 \sin \omega t$

6 x 5

2.   Answer **Any Six** Questions
   a.   Explain the working of Zener diode as voltage regulator.
   b.   Define a filter circuit? Draw the circuit diagram of pi (π) filter and explain its working.
   c.   Draw the circuit diagram for voltage divider bias configuration. Determine its operating point and stability factor.
   d.   Differentiate between voltage and power amplifier.
   e.   Design a subtractor using OPAMP.

f. Find the h parameters of CE configuration and draw the simplified diagram.

g. Find the expressions for voltage gain of inverting and non-inverting OPAMP.

3	With neat circuit diagram explain the working of RC coupled amplifier with its frequency response curve.	10
4	With neat circuit diagram explain the working of Class – B push pull amplifier.	10
5	Define Barkhausen Criterion for oscillation. Draw the circuit diagrams of Colpitts and Hartley oscillator using BJT. Also specify their frequency of oscillation.	10
6	Design an integrator and a differentiator using OPAMP.	10
7	Explain the working of full wave bridge rectifier. Derive the expressions for DC and RMS values of rectifier output. Calculate its rectification efficiency and ripple factor.	10

ANALOG ELECTRONICS AND OP-AMP

(Code : ETT-321)

Full Marks : 70

Time : 3 hours

Answer any **five** questions

Figures in the right-hand margin indicate marks

1. (a) What are the essentials of Transistor Oscillator ?   2

   (b) Write the difference between BJT and FET.   5

   (c) Derive the expression for rectification efficiency of half wave rectifier.   7

2. (a) What do you mean by an Ideal Diode ?   2

   (b) Explain working of Tunnel diode and draw its characteristics curve.   5

   (c) With neat sketch explain working of RC coupled amplifier with frequency response curve.   7

3. (a) Define CMRR and Slew Rate. 2

(b) With neat circuit arrangement explain the input and output characteristics of Common emitter transistor configuration. 5

(c) Explain the operation of class B push pull amplifier with its neat circuit diagram. 7

4. (a) Define Stabilization and write its need. 2

(b) Derive the expression for voltage gain of negative feedback transistor amplifier. 5

(c) Explain principle of operation of Wein -Bridge Oscillator with neat circuit diagram. 7

5. (a) What is transconductance in case of an UJT ? 2

(b) With neat circuit diagram describe the working principle of full wave Bridge rectifier. 5

(c) Explain voltage divider biasing of Transistor with neat circuit diagram. 7

6. (a) What is TUF ? 2

(b) With neat circuit diagram explain different rectification filter circuits. 5

(c) Describe working of Integrator and differentiator using op-amp with proper circuit diagram. 7

7. (a) Draw the equivalent circuit of op-amp. 2

(b) State different configurations of transistor with neat circuit diagram. Used PNP and NPN transistor. 5

(c) Describe the operating of different types of Clipping and clamping circuit with proper diagram. 7

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ANALOG ELETRONICS AND OP-AMP

(Code—ETT-321)

Full Marks : 70

Time : 3 hours

Answer any five questions

Figures in the right-hand margin indicate marks

1. (*a*) What is a thermistor ?   2

  (*b*) Derive an expression for efficiency of a halfwave rectifier.   5

  (*c*) With neat circuit diagram and waveforms, explain the working principle of a full-wave bridge rectifier ? What is the efficiency and ripple factor of a full-wave rectifier ?   7

2. (*a*) Write down (any two) the difference between intrinsic and extrinsic semiconductors ?   2

  (*b*) With neat circuit diagram explain the working principle of an RC coupled amplifier ?   5

diagram.

With neat circuit arrangement explain ...

(2)

(c) What is a feedback amplifier ? Explain the general theory of feedback amplifiers. 7

3. (a) Justify the name OP-AMP ? 2

(b) Describe the general circuit of simple OP-AMP ? 5

(c) Explain the operational difference between differentiator and integrator using OP-AMP. 7

4. (a) Write down the types of oscillators. 2

(b) With neat circuit diagram explain the working principle of Heartly oscillator. 5

(c) Describe the different biasing methods of FET. 7

5. (a) Define Transistor biasing. 2

(b) Write down the difference between JFET and BJT. 5

(c) Write down the principle of operation of FET, with neat circuit diagram. 7

III—Sem/ELECT/2018 (WXOld)(ETT-321)

(Continued)

(3)

6. (a) What is a Tunnel diode ? 2

(b) Write down the difference between choke input filter and Π-filter ? 5

(c) What is breakdown of a P-N junction ? Differentiate avalanche breakdown from zenor breakdown. 7

7. (a) What is stabilisation ? 2

(b) Describe the VI characteristics of a P-N junction diode under forward and reverse bias condition ? 5

(c) Define and explain the h-parameters of a transistor ? 7

III—Sem/ELECT/2018 (WXOld)(ETT-321)

VT—2,200

III—Sem/ELECT/2019(S)(New)

ANALOG ELECTRONIC AND OP-AMP

(Code : ETT-321)

Full Marks : 80   *Time* : 3 hours

Answer any **five** questions including **Q. Nos. 1 & 2**

Figures in the right-hand margin indicate marks

1. Answer *all* questions in brief :   2 × 10

   (*a*) Define Knee voltage.

   (*b*) Define transistor biasing.

   (*c*) What is transconductance in case of an FET ?

   (*d*) Define the characteristics of an ideal OP-AMP.

   (*e*) Define stabilization and writes its need.

   (*f*) Define DC-Load Line.

   (*g*) What is Barkhausen condition for sustained oscillation ?

   (*h*) What is filter and need of filter ?

   (*i*) What are essential components of transistor oscillator ?

   (*j*) Define ripple and ripple factor.

2. Answer any *six* questions :   5 × 6

   (*a*) Explain the operation of choke input filter.

   (*b*) Explain the construction and working of a P-N junction diode in Forward biase and Reverse Biase Condition.

   (*c*) Explain voltage divider biasing with a neat circuit diagram.

   (*d*) Write down the difference between BJT and FET.

   (*e*) Draw the neat circuit diagram and explain the operation of phase shift oscillator.

   (*f*) Explain voltage follower and buffer.

   (*g*) Write down the difference between voltage amplifier and power amplifier.

3. Derive the expression for rectification efficiency of full wave bridge rectifier with diagram.   10

4. With neat circuit arrangement explain input and output characteristics of common emitter transistor configuration.   10

5. Explain the operation of class B push pull amplifier with its neat circuit diagram and write down its advantages and disadvantages. 10

6. Describe the inverting and non-inverting OP-AMP. 10

7. Describe the working principle of transformer coupled amplifier with neat diagram and gives its frequency response curve. 10

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ANALOG ELECTRONICS AND OP-AMP

(Code : ETT-321)

Full Marks : 70   Time : 3 hours

Answer any **five** questions

Figures in the right-hand margin indicate marks

1. (a) What is a clamping circuit ?   2

   (b) Explain the construction and working principle of a PN junction diode in forward and reverse bias condition.   5

   (c) Explain how a Zener diode can act as a voltage regulator.   7

2. (a) What is knee voltage ?   2

   (b) Derive the expression for overall gain of a negative feedback amplifier.   5

   (c) Explain the principle of operation of a Class-B push pull amplifier, with neat circuit diagram.   7

3. (a) What is a filter ? Why we need a filter in a circuit ?   2

   (b) What are the differences between voltage amplifier and power amplifier ?   5

   (c) What is a feedback amplifier ? Explain the general theory of feedback amplifier.   7

4. (a) What is ripple and ripple factor ?   2

   (b) With neat circuit diagram explain the working principle of a full-wave bridge rectifier ? State its advantages.   5

   (c) Derive the relationship between α, β and γ of a transistor.   7

5. (a) State avalanche breakdown.   2

   (b) Explain the working principle of a Tunnel diode. Explain its characteristics and use.   5

   (c) Describe the operation of clipping and clamping circuits.   7

6. (a) What is an OP-AMP ?   2

   (b) Describe the stages of OP-AMP.   5

   (c) Describe the principle of operation of inverting and non-inverting types of OP-AMP.   7

7. (a) Define DC load line.   2

   (b) With a neat circuit diagram, explain the voltage divider biasing used in a transistor amplifier.   5

   (c) Write down the working principle of NPN and PNP transistors.   7