

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

**Course Code: EE203**

**Course Name: ANALOG ELECTRONICS CIRCUITS**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks.*

Marks

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|---|--|-----|
| 1 | Draw the circuit of a simple zener voltage regulator and design the value of series resistor $R_S$ for a load voltage of 12V. Given $R_L = 500 \Omega$ , $I_{zmax} = 80 \text{ mA}$ , $I_{zmin} = 10 \text{ mA}$ , $V_{inmin} = 15 \text{ V}$ , $V_{inmax} = 18 \text{ V}$ . | (5) |
| 2 | Draw the frequency response characteristics of RC coupled amplifier and explain the reasons behind its shape.  | (5) |
| 3 | List out the merits and demerits of negative feedback on amplifier performance   | (5) |
| 4 | Compare the characteristics of ideal Op-Amps and practical Op-Amps.  | (5) |
| 5 | Draw the circuit of an inverting amplifier and obtain the expression for its closed loop gain.   | (5) |
| 6 | Draw the Schmitt trigger circuit and determine the threshold voltages $V_{UT}$ and $V_{LT}$ in a circuit with two resistors $18 \text{ k}\Omega$ and $1 \text{ k}\Omega$ , $V_{ref} = 4 \text{ V}$ , and saturation voltage $= \pm 15 \text{ V}$                             | (5) |
| 7 | With necessary diagrams explain the operation of OP-Amp square wave generator.   | (5) |
| 8 | Explain the operation of Op-Amp crystal oscillator.  | (5) |

**PART B**

*Answer any two full questions, each carries 10 marks.*

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|----|---|------|
| 9  | a) Draw and explain the h parameter small signal low frequency model for BJT.   | (4)  |
|    | b) Derive the expressions for current gain, input impedance, voltage gain and output impedance using h parameters of BJT.   | (6)  |
| 10 | a) Draw and explain small signal model of FET.  | (4)  |
|    | b) Obtain the operating point set by the voltage divider bias circuit for an NPN CE transistor with $\beta = 50$ and $V_{BE} = 0.7 \text{ V}$ . Given $V_{CC} = 18 \text{ V}$ , $R_1 = 82 \text{ k}\Omega$ , $R_2 = 22 \text{ k}\Omega$ , $R_C = 5.6 \text{ k}\Omega$ and $R_E = 1.2 \text{ k}\Omega$ . | (6)  |
| 11 | Explain the construction, biasing, operation and characteristics of JFET.   | (10) |

**PART C**

*Answer any twofull questions, each carries10 marks.*

- 12 a) With necessary diagrams explain the working of class A transformer coupled amplifier and obtain the maximum overall efficiency. (8)
- b) What are its advantages and disadvantages (2)
- 13 a) Compare different types of multistage amplifiers. (5)
- b) With a neat circuit diagram explain the operation of Colpitt's oscillator using BJT. (5)
- 14 a) Define the following terms (8)
- i) CMRR ii) Slew rate iii) Input bias current (iv) Input offset voltage
- b) Give the typical values of above parameters for 741 IC (2)

**PART D**

*Answer any twofull questions, each carries 10 marks.*

- 15 a) Explain the operation of Op-Amp integrator and differentiator circuits. (6)
- b) Explain the working and design of a triangular wave generator circuit with necessary diagrams. (4)
- 16 a) What are the features of instrumentation amplifier? Derive the expression for output voltage of an instrumentation amplifier. (6)
- b) Design the feedback circuit of a Wein Bridge oscillator with 2MHz output frequency. (4)
- 17 With the help of internal circuit diagram of IC555 explain the operation of astable multivibrator. Derive the expression for frequency of oscillation. (10)

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