

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017**

**Course Code: EE203**

**Course Name: ANALOG ELECTRONICS CIRCUITS (EE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks.*

Marks

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|---|--|-----|
| 1 | With a neat circuit diagram explain the working of a negative voltage clamping circuit. Also sketch the output waveform for $\pm 5V$ square wave input.  | (5) |
| 2 | Explain the construction and operation of Enhancement type metal oxide semiconductor FET with neat diagrams.   | (5) |
| 3 | In an amplifier open loop gain changes by $\pm 50\%$ using a series voltage negative feedback. The amplifier is to be modified to get a gain of 100 with $\pm 0.1\%$ variation. Find the required open loop gain of the amplifier and the amount of negative feedback. | (5) |
| 4 | Explain Barkhausen criteria of sustained oscillation   | (5) |
| 5 | Derive the expression for voltage gain of a non-inverting amplifier.   | (5) |
| 6 | Design a three input summing amplifier using op-amp having gains of 2,3 and 5 respectively for each input.   | (5) |
| 7 | Define slew rate and explain its effect on waveform generation.  | (5) |
| 8 | Design a phase shift oscillator to have 1.5kHz output frequency using a 741 op-amp with $V_{cc} = \pm 12V$ .   | (5) |

**PART B**

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

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| 9  | Design a voltage divider bias circuit to operate from a 18V supply in which bias conditions are to be $V_{CE} = V_E = 6V$ and $I_C = 1.5mA$ . $\beta = 90$ . Also calculate the stability factor S. | (10) |
| 10 | a) Draw a common source FET amplifier. Using small signal equivalent circuit derive the expression of the voltage gain. (6)   | (6)  |
|    | b) Explain the reasons for reduction of gain at high frequencies of a CE amplifier. (4)   | (4)  |
| 11 | a) Explain the operation of a Zener voltage regulator with a neat circuit diagram. (5)  | (5)  |
|    | b) Define Miller's theorem. (2)   | (2)  |
|    | c) In a CE amplifier circuit, $h_{fe} = 50$ , $h_{ie} = 1.3k\Omega$ , $C_{bc} = 5pF$ , $R_C = 3k\Omega$ , $R_L = 2.2k\Omega$ . Calculate the Miller capacitance. (3)                                | (3)  |

**PART C**

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

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| 12 | a) Draw the circuit diagrams of two stage RC coupled and Transformer coupled amplifiers. Discuss the important features and applications of both. (6) | (6) |
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- b) A transformer coupled class A power amplifier draws a current of 250mA from a collector supply of 13 V. When no signal is applied to it determine i) Maximum output power ii) Power rating of the transistor iii) Maximum collector efficiency. (4)
- 13 a) With a neat diagram explain the working of a Hartley oscillator. (8)
- b) A Wien bridge oscillator has the following components  $R_1 = R_2 = R_4 = 5.6 \text{ k}\Omega$ ,  $R_3 = 12 \text{ k}\Omega$  and  $C_1 = C_2 = 2000 \text{ pF}$ . Calculate the oscillating frequency. (2)
- 14 a) Derive the expression for voltage gain of a dual input balanced output differential amplifier. (7)
- b) Why open loop op amp configurations are not used for linear applications? (3)

**PART D**

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

- 15 a) Draw and explain the operation of a square waveform generator using opamp. (5)
- b) Explain inverting Schmitt trigger circuit with relevant waveforms. (5)
- 16 a) Draw and explain the circuit of IC 555 in Monostable mode with relevant waveforms. (7)
- b) What are the advantages of crystal oscillators. (3)
- 17 a) Explain the working of Instrumentation amplifier with a neat diagram. (6)
- b) In an astable multivibrator using 555,  $R_B = 750 \Omega$ . Determine the values of  $R_A$  and C to generate a 1.0 MHz clock that has a duty cycle of 25%. (4)

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