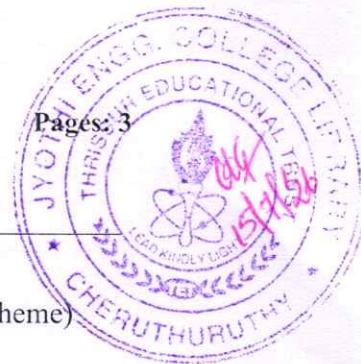


Reg No.: \_\_\_\_\_

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S4 (S,FE) (FT/WP/S2PT) Examinations May 2026 (2019 Scheme)



**Course Code: ECT202**

**Course Name: ANALOG CIRCUITS**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*(Answer all questions; each question carries 3 marks)*

Marks

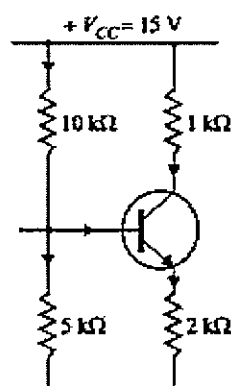
- |    |                                                                                                                                                           |   |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1  | What is the need for biasing a transistor? What factors are to be considered for selecting the operating point Q?                                         | 3 |
| 2  | Determine the stability factor of a fixed bias common emitter BJT amplifier with $V_{CC}=15V$ , $R_C=10K$ , $R_B=5K$ and $\beta=200$                      | 3 |
| 3  | State Millers theorem. Explain how it is used in a two port electrical network                                                                            | 3 |
| 4  | A CE amplifier with voltage divider biasing has $V_{RE}=1.5V$ , $V_{RC}=6V$ , $V_{CC}=12V$ , $I_{CQ}=2mA$ and $\beta=150$ . Find $R_1$ , $R_2$ , Q-point. | 3 |
| 5  | Draw the small signal equivalent circuit of MOSFET                                                                                                        | 3 |
| 6  | What is the effect of cascading on gain and bandwidth in amplifiers?                                                                                      | 3 |
| 7  | In spite of reduction in gain, negative feedback is preferred for amplifiers. Justify the statement                                                       | 3 |
| 8  | Draw the block diagram of voltage series and voltage shunt feedback amplifier?                                                                            | 3 |
| 9  | Compare class A, class B, and class AB power amplifiers                                                                                                   | 3 |
| 10 | What is cross over distortion? How it can be avoided?                                                                                                     | 3 |

**PART B**

*(Answer one full question from each module, each question carries 14 marks)*

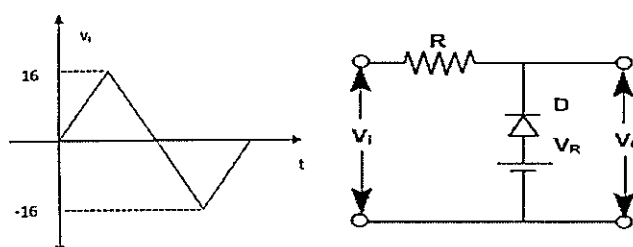
**Module -1**

- |    |                                                                                                                                                           |   |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 11 | a) For the fixed bias circuit, derive an expression for stability factors $S_{I_{CO}}$ , $S_{V_{BE}}$ , $S_{\beta}$                                       | 6 |
|    | b) Explain the working of an RC integrator circuit for a square wave input with period T. Sketch its output waveform for $RC > T$ , $RC = T$ and $RC < T$ | 8 |
| 12 | a) Draw the d.c. load line and determine the operating point of the given circuit. Assume the transistor to be of silicon. Take, $\beta=100$              | 8 |



- b) Sketch the output waveform and transfer characteristics ( $V_R=3V$ )

6



### Module -2

- 13 a) Design an RC coupled amplifier for a gain of 200, given that  $V_{cc}=15V$  and  $I_c=3.2mA$  and required input impedance is  $1.44K\Omega$ . Find the lower cutoff frequency of the amplifier. Assume capacitor values appropriately if necessary. 10
- b) Explain the need of various components in a RC coupled amplifier with a neat circuit diagram. 4
- 14 a) Differentiate between AC and DC load lines 4
- b) Draw the high frequency hybrid  $\pi$  model of BJT in CE configuration and explain the significance of each parameter 10

### Module -3

- 15 a) Draw a CS MOSFET amplifier. With the help of small signal equivalent circuit, compute its voltage and current gains 10
- b) Explain biasing techniques used in MOSFET amplifiers 4
- 16 a) Calculate the drain current and drain-to-source voltage of a common source 10

circuit with an n-channel enhancement mode MOSFET. Find the power dissipated in the MOSFET.  $R_1=22K\Omega$ ,  $R_2=10K\Omega$ ,  $R_D=6.8K\Omega$ ,  $V_{DD}=8V$ ,  $V_T=1V$ ,  $K_n=0.1mA/V^2$

- b) How wide bandwidth is obtained in Cascode amplifier? 4

#### Module -4

- 17 a) How does negative feedback affect input and output impedances in feedback amplifiers? 4
- b) Give the block schematic of current-series feedback amplifier configuration and deduce the expression for gain, input impedance and output impedance with feedback. 10
- 18 a) Prove that the gain  $A=3$  and  $\beta=1/3$  for Wein bridge oscillator. Draw the frequency selective network of the oscillator 10
- b) With neat diagram explain the working principle of crystal oscillator 4

#### Module -5

- 19 a) In a class B amplifier  $V_{CEmin} = 2V$ , supply voltage  $V_{CC} = 15V$ . Find the collector circuit efficiency  $\eta$ . 5
- b) Draw the circuit and explain the working of complementary symmetry push pull amplifier 9
- 20 a) Design a discrete series voltage regulator with short circuit protection for regulated output voltage 10V and maximum current 100mA 9
- b) With the help of VI characteristics, explain foldback protection. 5

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