BEC303

**Third Semester B.E./B.Tech. Degree Examination, June/July 2025**
## Electronic Principles and Circuits

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.*
*2. M : Marks , L: Bloom's level , C: Course outcomes.*

| | | Module – 1 | M | L | C |
|---|---|---|---|---|---|
| Q.1 | a. | Define the following:<br>i) Voltage – divider bias<br>ii) CC Amplifier<br>iii) TSEB | 6 | L1 | CO1 |
| | b. | Discuss the importance of Emitter Resistance ($R_E$) with respect to voltage divider bias circuit on Q-point calculate with its supportive graph. | 8 | L2 | CO1 |
| | c. | Compare and summarize with respect to bias circuits; Emitter bias vs voltage divider bias vs two supply emitter bias. | 6 | L2 | CO1 |
| | | **OR** | | | |
| Q.2 | a. | With suitable circuit and waveforms, Discuss TSEB amplifier. | 8 | L2 | CO1 |
| | b. | Derive the voltage gain equation for the CE amplifier from T model and $\pi$ model. | 6 | L2 | CO1 |
| | c. | Explain the concept of emitter follower amplifier with suitable waveforms and circuit. | 6 | L2 | CO1 |
| | | **Module – 2** | | | |
| Q.3 | a. | With neat circuits, deduce the common source amplifier using MOSFET (without $R_s$) obtain overall gain ($G_v$). | 10 | L2 | CO2 |
| | b. | Explain the biasing of a MOSFT using fixed $V_g$ and a resistance in source, obtain the current $I_d$ expression with neat circuit diagram. | 10 | L2 | CO2 |
| | | **OR** | | | |
| Q.4 | a. | Design an MOSFET model of small-signal equivalent circuit by considering various parameter of the model. | 10 | L2 | CO2 |
| | b. | With respect to common-gate amplifier. Derive the equation for overall gain, open circuit voltage gain and voltage gain. | 10 | L2 | CO2 |
| | | **Module – 3** | | | |
| Q.5 | a. | Discuss the concept of R to 2R ladder type digital to analog converter by considering 4-bit binary input with an Op-Amp circuit also demonstrate the equivalent analog output for the data "1010". | 10 | L2 | CO3 |
| | b. | Explain Colpitt's oscillators with its AC equivalent circuit and design parameter. | 10 | L2 | CO3 |

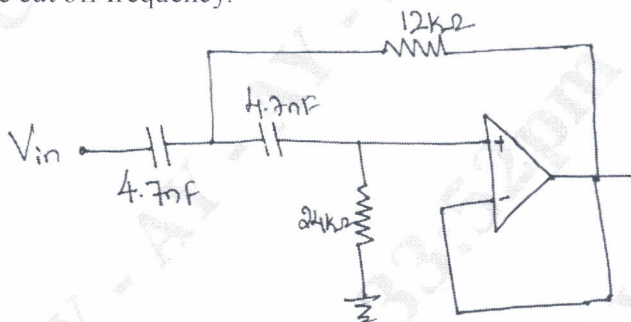| | | | | | |
|---|---|---|---|---|---|
| | | **OR** | | | |
| Q.6 | a. | Explain the following in view of linear op-amps:<br>i) Schmitt Trigger<br>ii) Single supply comparator | 10 | L2 | CO3 |
| | b. | Design an astable multivibrator using 555 timer with design equations of "T" and frequency. | 10 | L2 | CO3 |
| | | **Module – 4** | | | |
| Q.7 | a. | Summarize various voltage and current amplifier and converter with respect to ideal negative feedback circuits. | 10 | L2 | CO4 |
| | b. | Explain low-pass first order stage with non-inverting unity gain and inverting with voltage gain with suitable op-amp circuit and equations. | 10 | L2 | CO4 |
| | | **OR** | | | |
| Q.8 | a. | Design an second order VCVS unity gain low pass filter for Butterworth responses with an Op-Amp circuit also comment on the frequencies of operation. | 10 | L2 | CO4 |
| | b. | Calculate the value of Q and pole frequency for circuit shown in Fig.Q.8(b) also find the cut off frequency.<br><br>Fig.Q.8(b) | 5 | L2 | CO4 |
| | c. | Discuss the concept of MFB bandpass filter with the equation for "$f_o$". | 5 | L2 | CO5 |
| | | **Module – 5** | | | |
| Q.9 | a. | Briefly describe the concept of DC load line and AC load line with neat circuit | 10 | L2 | CO5 |
| | b. | Explain class B Push-Pull Emitter follower with neat circuit diagram discuss cross-over distortion. | 10 | L2 | CO5 |
| | | **OR** | | | |
| Q.10 | a. | Describe the concept of Gate-Triggering in silicon controlled rectifier. | 8 | L2 | CO5 |
| | b. | Write short notes on following:<br>i) Photo SCR<br>ii) UJT<br>iii) PUT<br>iv) Silicon controlled switch | 12 | L2 | CO5 |

* * * * *