

University of Mumbai

Examination 2020

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: ECC302 and Course Name: Electronic Circuits and communication Fundamentals

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the questions are compulsory and carry equal marks |
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| 1. | Internal transistor junction capacitances affect the high-frequency response of amplifiers by |
| Option A: | Reducing the amplifier's gain only |
| Option B: | Reducing the amplifier's gain and introducing phase shift as the signal frequency increases. |
| Option C: | Introducing phase shift as the signal frequency increases. |
| Option D: | Having no effect. |
| 2. | _____ Frequencies are values of frequency at which the RC circuits reduce the voltage gain to 70.7% of its midrange value. |
| Option A: | Critical |
| Option B: | Maximum |
| Option C: | Normal |
| Option D: | Nominal |
| 3. | Doubling the voltage gain of an amplifier causes a _____ dB _____. |
| Option A: | 10, increase |
| Option B: | 10, decrease |
| Option C: | 6, increase |
| Option D: | 6, decrease |
| 4. | A certain amplifier has a bandwidth of 22.5 kHz with a lower cutoff frequency of 600 Hz. What is the value of higher cut off frequency (F_{cu})? |
| Option A: | 21.9 kHz |
| Option B: | 23.1 kHz |
| Option C: | 600 Hz |
| Option D: | 22.5 kHz |

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| 5. | Which of the following coupling method is not suitable for two or multistage cascade connection? |
| Option A: | Direct coupling |
| Option B: | R-C coupling |
| Option C: | Transformer coupling |
| Option D: | Inductance coupling |
| | |
| 6. | The formula for closed loop voltage gain of amplifier with feedback using open loop voltage gain A and gain of feedback circuit B will be _____. |
| Option A: | $AF=A*B$ |
| Option B: | $AF= -B/(1+AB)$ |
| Option C: | $AF= A/(1+AB)$ |
| Option D: | $AF= - A/(1+AB)$ |
| | |
| 7. | Negative feedback in an amplifier improves: |
| Option A: | Output SNR improvement & Reduces distortion |
| Option B: | Reduces output SNR |
| Option C: | Increases distortion |
| Option D: | Decreases distortion |
| | |
| 8. | For a circuit to become an oscillator, the criteria of Barkhausen is |
| Option A: | Total loop gain $A\beta$ must be unity. |
| Option B: | Total phase shift around the loop must be zero or 360 degree |
| Option C: | Unity loop gain and 0 or 360 Phase shift both must satisfied |
| Option D: | only phase shift of 0 degree is required |
| | |
| 9. | RC phase shift oscillators contain a minimum of _____ Phase shift network. |
| Option A: | 2 |
| Option B: | 3 |
| Option C: | 4 |
| Option D: | 0 |
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| 10. | An amplifier has an input signal voltage of 0.034 mV. The output voltage is 12.5 V. The voltage gain in dB is |
| Option A: | 53.6 dB. |

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| Option B: | 231 dB. |
| Option C: | 107.3 dB. |
| Option D: | 111.3 dB |
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| 11. | Which of the following is not a type of LC oscillator? |
| Option A: | Crystal oscillator |
| Option B: | Hartley oscillator |
| Option C: | Clapp oscillator |
| Option D: | Colpitts oscillator |
| | |
| 12. | For a Wien Bridge Oscillator given that $R_1=20k\Omega$, $C_1=2nF$, $R_2=20k\Omega$, $C_2=2nF$, find the approximate resonant frequency. |
| Option A: | 25kHz |
| Option B: | 15kHz |
| Option C: | 8 kHz |
| Option D: | 4 kHz |
| | |
| 13. | The difference output of the differential amplifier is the amplification of _____. |
| Option A: | Difference between the voltages of input signals |
| Option B: | Difference between the output of each transistor |
| Option C: | Difference between the supply and the output of each transistor |
| Option D: | No difference is measured between outputs of the transistors |
| | |
| 14. | If $A_{DM} = 1500$ and $A_{CM} = 0.15$, the CMRR value in dB is _____. |
| Option A: | 44 dB |
| Option B: | 60 dB |
| Option C: | 80 dB |
| Option D: | 90 dB |
| | |
| 15. | A current mirror can be used as an active load because it has |
| Option A: | Low dc resistance |
| Option B: | High ac resistance |
| Option C: | Low ac resistance |
| Option D: | High dc resistance |
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| 16. | The advantage of a cascode current mirror over a simple current mirror is |
| Option A: | Output resistance of cascode mirror is larger |
| Option B: | Cascode requires lesser area |
| Option C: | Cascode mirror gives more voltage value range |
| Option D: | Both lesser area and large voltage headroom. |
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| 17. | The maximum efficiency of resistance loaded class A power amplifier is |
| Option A: | 75 % |
| Option B: | 50 % |
| Option C: | 40 % |
| Option D: | 25 % |
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| 18. | What is the purpose of heat sink in power amplifier circuit? |
| Option A: | Provides extra temperature from the surrounding. |
| Option B: | Helps to dissipate the heat by transferring it to the surrounding. |
| Option C: | Used for providing extra mechanical support. |
| Option D: | Helps to reduce the miller effects in the transistors. |
| | |
| 19. | Which of the device does not have the gate terminal? |
| Option A: | TRIAC |
| Option B: | FET |
| Option C: | SCR |
| Option D: | DIAC |
| | |
| 20. | Which power amplifier has the highest collector efficiency? |
| Option A: | Class A |
| Option B: | Class B |
| Option C: | Class C |
| Option D: | Class AB push pull |

Option 3

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| Q2. | 20 marks |
| A. | Solve any Two 5 marks each |
| i. | With a neat, labelled diagram, explain the Hartley oscillator. |
| ii. | What are the methods to overcome cross over distortion in Class B power amplifier? |
| iii. | What are the methods of cascading Multistage amplifier? Compare them. |
| B. | Solve any One 10 mark each |
| i. | <p>Calculate bandwidth for single stage CE amplifier, following parameters are available for the given circuit.</p> <p>$\beta = 100, r_e = 30 \Omega, A_V = 1.$</p> |
| ii. | Explain the working of silicon-controlled rectifier (SCR) using the two-transistor analogy with a neat, labelled diagram. Draw the structure / construction with V-I characteristics of SCR. |

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| Q3. | 20 marks |
| A. | Solve any Two 5 marks each |
| i. | Explain Miller effect and unity gain bandwidth product concept. |
| ii. | Draw MOSFET differential amplifier with active load. |
| iii. | Compare voltage series and current shunt feedback amplifiers. |
| B. | Solve any One 10 mark each |
| i. | Draw Class A transformer coupled amplifier & load line, derive the expressions for the maximum overall operating efficiency $\eta_{o(max)}$ & maximum |

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| | collector conversion efficiency $\eta_{c(max)}$. |
| ii. | Explain working of RC phase shift oscillator. Give expression for frequency of oscillations. |