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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **15EI2002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MEDICAL ELECTRONICS** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | | | | **Course outcome** | | | **Marks** |
| **PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)** | | | | | | | | |
| 1. | The minimum voltage required for a transistor to work is\_\_\_\_\_\_\_ | | | | | CO2 |  | |
|  | a. 0v | b.0.7v | c.0.7mV | d. undefined | |  | (1) | |
| 2. | For a transistor to work the collector base junction and emitter base junction should be \_\_\_\_\_\_\_\_\_\_\_\_\_biased. | | | | | CO2 |  | |
|  | a. Forward, forward | b. forward, reverse | c. reverse, forward | d. reverse, reverse | |  | (1) | |
| 3. | Calculate is the level of IB if IC = 10 mA and IE = 10.2 mA. | | | | | CO1 |  | |
|  | a.0.2mA | b. 200mA | c. 200 µA | d. 20.2mA | |  | (1) | |
| 4. | In a JFET ID is controlled using | | | | | CO2 |  | |
|  | 1. VGS | b. VDS | c.IG | d.VDG | |  | (1) | |
| 5. | Which of the following transistor(s) has (have) depletion and enhancement types? | | | | | CO2 |  | |
|  | a.BJT | b. JFET | c. MOSFET | d.UJT | |  | (1) | |
| 6. | A BJT is a \_\_\_\_\_-controlled device. The JFET is a \_\_\_\_\_ - controlled device. | | | | | CO1 |  | |
|  | a. voltage, voltage | b.voltage, current | c.current, voltage | d.current, current | |  | (1) | |
| 7. | When ID = 0 mA the resultant VGS is refered as | | | | | CO1 |  | |
|  | a.VGS(off) | b. VP | c. VDS | d.Vv | |  | (1) | |
| 8. | The region to the left of the pinch-off locus is referred to as the \_\_\_\_\_ region. | | | | | CO2 |  | |
|  | a. saturation | b. cutoff | c. ohmic | d.active | |  | (1) | |
| 9. | UJT exhibits negative resistance region | | | | | CO1 |  | |
|  | a. Before the peak point | b. Between peak and valley points | c. After the valley point | d.Before cut off region | |  | (1) | |
| 10. | You need to design a relaxation oscillator, the most likely device to use might be | | | | | CO3 |  | |
|  | a. SCR | b. UJT | c. optocoupler | d. 4 Terminal diode | |  | (1) | |
| 11. | For an oscillator to have perfect oscillations, the phase shift should be | | | | | CO3 |  | |
|  | a. 0 | b. 180 | c. 90 | d. 270 | |  | (1) | |
| 12. | An optocoupler is used as \_\_\_\_\_\_\_ in medical equipments | | | | | CO3 |  | |
|  | a. oscillator | b. insulator | c. Isolator | d. amplifier | |  | (1) | |
| 13. | Electrical activity of heart refers to | | | | | CO3 |  | |
|  | a.EEG | b.EMG | c.ECG | d.EGG | |  | (1) | |
| 14. | What causes piezoelectric crystal to work as peizosensor | | | | | CO3 |  | |
|  | a. heating effect | b. dissimilar metals | c. water running on ions | d. pressure on crystal | |  | (1) | |
| 15. | MRI stands for | | | | | CO3 |  | |
|  | a. Magnetic resonance Imaging | b. Medical research Instructions | c. Magnetic resolution imaging | d. Magnetic recording imaging | |  | (1) | |
| 16. | \_\_\_\_\_ is an electrical pulse generator that starts or maintains normal heart rhythm | | | | | CO3 |  | |
|  | a. pacemaker | b. defibrillator | c. TENS | d. Thermometer | |  | (1) | |
| 17. | EMG measures- Electrical activity of :- | | | | | CO3 |  | |
|  | a.heart | b. brain | c. muscle | d. visual cortex | |  | (1) | |
| 18. | I am a radiologist, I need to setup a new radiology center. Your are a sales personal from some XYZ Medical Inst. co.Out of the following options which instrument you will advise me to purchase? | | | | | CO1 |  | |
|  | a.Patient Monitoring System | b. ECG Unit | c. X-Ray Unit | d. , PH meter | |  | (1) | |
| 19. | Ventilators are mostly used in | | | | | CO3 |  | |
|  | a. ICU | b. home | c. Emergency medicine | d.clinics | |  | (1) | |
| 20. | The study of electrical parameters of the body | | | | | CO1 |  | |
|  | a.Biomaterials | b. Bioimpedence | c. Biopotentials | d. Bioamplifirers | |  | (1) | |

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| 21. | An audiometer is a \_\_\_\_\_\_\_\_ instrument. | | | | CO2 |  |
|  | a. Diagnostic | b. therapeutic | c. analytical | d. supplementary |  | (1) |
| 22. | The basic buiding block of an organism | | | | CO3 |  |
|  | a. tissues | b.genes | c.cells | d.organs |  | (1) |
| 23. | For small signal ac operation, a practical forward biased diode can be modeled as | | | | CO1 |  |
|  | a. Resistance and capacitance in series | b. Ideal diode and resistance in parallel | c. Resistance and ideal diode in series | d.   Resistance |  | (1) |
| 24. | Zener diode works as a | | | | CO1 |  |
|  | a.It is a rectifier diode. | b. It is a constant voltage device | c. It is a constant current device | d. It works in the forward region |  | (1) |
| 25. | The primary application of a voltage regulator is to | | | | CO1 |  |
|  | a. Converts the ac voltage to dc voltage | b. Smoothens the ac variation in dc output voltage | c. Maintains a constant dc output voltage inspite of the fluctuations in ac input voltage or load current | d. None of the above |  | (1) |
| 26. | The saturation region in BJT works when | | | | CO2 |  |
|  | a Both the junctions are reverse biased  . | b. Base emitter junction is in reverse biased, and base collector junction is forward biased | c. Base emitter junction is in forward biased, and base collector junction is reverse biased | d. Both the junctions are forward biased |  | (1) |
| 27. | Which of the following approximation is often used in electronic circuit | | | | CO2 |  |
|  | a. IE=IC | b.IC=IB | c.IB=IE | d.IB=IC+IE |  | (1) |
| 28. | Input characteristics of CE amplifier is obtained by plotting | | | | CO1 |  |
|  | a.VCE vs. IC for constant value of IE | b. VBE vs. IE for constant value of VCE | c. VBE vs. IB for constant value of IC | d. VBE vs. IB for constant value of VCB |  | (1) |
| 29. | In an NPN transistor the electrons move from emitter and | | | | CO1 |  |
|  | a. recombine with holes in the base | b. recombine in the emitter its self | c. pass through the base to the collector | d. are stopped by the junction barrier |  | (1) |
| 30. | The leakage current ICBO flows in | | | | CO1 |  |
|  | a. The emitter, base and collector leads | b. The emitter and base leads. | c. The emitter and collector leads. | d. The base and collector leads |  | (1) |
| 31. | |  | | --- | | What does LED stands for? | | | | | CO1 |  |
|  | |  | | --- | | a Light emitting Display | | b. Low energy display | c. Light emitting diode | d. Light emitting detector |  | (1) |
| 32. | Which of the following works as charge transferring device? | | | | CO3 |  |
|  | a. UJT | b.BJT | c.FET | d.MOSFET |  | (1) |
| 33. | |  | | --- | | Which of these is the best description of a Zener diode? | | | | | CO3 |  |
|  | a. its a rectifier didoe | b. constant voltage deice | c. constant current device | d. it works min forward region |  | (1) |
| 34. | |  | | --- | | What is the current gain for a common-base configuration where IE = 4.2 mA and IC = 4.0 mA? | | | | | CO2 |  |
|  | a.0.95 | b.1 | c..99 | d.0.1 |  | (1) |
| 35. | |  | | --- | | I am a diode. Most often I am working as a capacitor. Who am I? | | | | | CO2 |  |
|  | a. Varactor diode | b.photo diode | c. tunnel diode | d.zener diode |  | (1) |
| 36. | |  | | --- | | Electrons on the outermost shell or orbit is called as | | | | | CO2 |  |
|  | a. valance elctrons | b.conduction band electrons | c.negative electrons | d.free electrons |  | (1) |
| 37. | Why is heat produced in a diode | | | | CO2 |  |
|  | a.due to voltage across the diode | b.due to pn junction | c.due to current passing through the diode | d.due to valance electrons |  | (1) |
| 38. | |  | | --- | | In power supply diagram which indicates a smooth dc output | | | | | CO3 |  |
|  | a. rectifier | b.regulator | c.filter | d.transformer |  | (1) |
| 39. | |  | | --- | | When matching polarity connections have been made and the potential difference (PD) is above 0.7 V, the diode is considered to be: | | | | | CO1 |  |
|  | a. forward biased | b.reverse biased | c.open switch | d.not working |  | (1) |
| 40. | A certain transistor has βDC of 230. When the base current is 30μA, Determine the emitter current | | | | CO2 |  |
|  | a. 6.93 mA | b.8 mA | c.10 mA | d.6mA |  | (1) |

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| **PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)** | | | |
| 41. | Analyze the PN junction formation. | CO2 | (5) |
| 42. | Comment on avalanche and zener breakdown. | CO1 | (5) |
| 43. | Describe a basic DC power supply with its significance. | CO3 | (5) |
| 44. | Based on the three regions of operation, analyze how JFET are used in biomedical applications. | CO2 | (5) |
| 45. | Determine the dc current gain βDC and the emitter current *I*E for a transistor where *I*B 50 µA and *I*C 3.65 mA. | CO3 | (5) |
| 46. | Briefly explain the operation and characteristics of photodiode and LED. | CO3 | (5) |
| 47. | Comment on Power MOSFETs and MOSFETS as charge transferring device. | CO2 | (5) |
| 48. | Write short notes on optocoupler used as isolator. | CO3 | (5) |
| 49. | Compare the construction, operation and characteristics of CE amplifier. | CO1 | (5) |
| 50. | Design an RC phase shift oscillator. Suggests the necessary conditions for oscillations. | CO1 | (5) |
| **PART C( 2 X 10 = 20 MARKS) (ANSWER ANY TWO)** | | | |
| 51. | Discuss three regions of operation of UJT and analyze how UJT is working as a relaxation oscillator. | CO2 | (10) |
| 52. | Differential amplifiers are widely used in practical situations. Comprehend the situation. | CO3 | (10) |
| 53. | In detail Explain DC Load line and its significance in transistor working. | CO1 | (10) |

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