BIRLA INSTITUTE OF TECHNOLOGY
MESRA – 835215, RANCHI, INDIA

UG

Name: …… Roll No.: ……..

Branch: …… Signature of Invigilator: ……

Semester: VIth Date: 26/04/2022 (MORNING)

Subject with Code: EE459 INTRODUCTION TO POWER ELECTRONICS

	Section A (30)	Section B (20)	Total Marks (50)
Marks Obtained			

INSTRUCTION TO CANDIDATE

1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.
2. The booklet will be distributed to the candidates before 05 minutes of the examination. **Candidates should write their roll no. in each page of the booklet.**
3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.
4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.
5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.
6. Write on both side of the leaf and use pens with same ink.
7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.
8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.
9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.
10. Always maintain the highest level of integrity. Remember you are a BITian.
11. Candidates need to **submit the question paper cum answer sheets before leaving the examination hall**.

BIRLA INSTITUTE OF TECHNOLOGY,MESRA,RANCHI

(END SEMESTER EXAMINATION) 26-04-22

CLASS: BTECH SEMESTER: VI

BRANCH: MECHANICAL SESSION:SP/2022

TIME: 2.**00 Hrs** FULL MARKS : 50

SUBJECT : EE-459 INTRODUCTION TO POWER ELECTRONICS

INSTRUCTIONS:

1. **Section- A has MCQs**, worth 30 Marks. All questions have to attempted in Sec-A
2. **Section-B is short answer** type, worth 20 Marks. Answer should be to the point.
3. The missing data, if any ,may be assumed suitably.
4. Before attempting the question paper be sure that you have got the correct question paper

Section-A(Q1---Q6---1 Marks, Q7---Q22--1.5 Marks)

Q1. npn BJT will fall into Which category—(a) Small Signal device (b) Power electronic device (c)Both small signal & Power electronic device (d)None of the above.

Q2. SOA (Safe Operating Area **)** is locus of (plot between)—(a) Current & Voltage of device (b)Current & Power of device (c) Current & Resistance of device (d) Voltage & Resistance of Device (e) None of the above.

Q3. BJT is — (a) Voltage Controlled Device (b) Current Controlled Device (c) Impedance Controlled Device (d) None of the above.

Q4. MOSFET is — (a) Voltage Controlled Device (b) Current Controlled Device (c) Impedance Controlled Device (d) None of the above.

Q5. Latching Current in **SCR** is related to –(a) Turn on (b) Turn off (c) Protection (d) Mounting of SCR

Q6. Holding Current in **SCR** is related to –(a) Turn on (b) Turn off (c) Protection (d) Mounting of SCR

Q7. Which of the following is most Practical & Widely used method of **turning on SCR.**-

(a) **dv/dt** triggering (b) **gate** triggering (c)Exceeding Forward Voltage above Break over voltage (d) Temperature Triggering.

Q8. Which of the following acts like **Controlled switch**—(a) BJT (b) MOSFET(c)SCR (d) All of the above (e) None of the above.

Q9. Which **MOSFET** has discontinuous channel—(a) D MOSFET (b) E MOSFET(c) Both (a)&(b) (d) MOSFET always have continuous channel

Q10. A DC Power Supply has full load output voltage of **24 Volt**(rated Voltage).Full load current is **2A** . No Load voltage is **24.5V**. Find the **Percentage Regulation**—(a)1.04% (b)2.08% (c) 4.16% (d)0.0208% (e) None

Q11. In A **Good Regulated** Supply **—**(a)Output Voltage should vary (b) Output Voltage should nearly be constant (c)Isolation between load & main supply should be there (d) Efficiency should be high—(1) a,c,d (2)b,c,d (3)a,b,c,d (4) all are irrelevant

Q12. Which of following is **false** about **SMPS –**(a) Mostly uses DC-DC converters (b) It regulates Voltage (c)These are Compact & Light weight (d) Operates at Low switching speed.

Q13. IC 7812 is main building Block of (a) Linear Power Supply (b) SMPS (c) Voltage Stabilizer (d) Flyback Converter (e) DC-DC Converter

Q14. An ideal Switch Which connects a Source to Load should have following Characteristic- In switch –(a) Zero Voltage & Zero Current when open.(b) Zero Voltage & Maximum Current when open (c) Full supply voltage & Maximum current when open (d) Full supply voltage & zero current when open (e) None of the above

Q15. **FBSOA** in **Power BJT** is plot between—(a) I_B - V_{BE} (b) I_B – I_c (c) I_B – V_{CE} (d) Ic - V_{CE}

Q16. SOA in Electronic device is related to Voltage ,Current ,Power Dissipation in—(a)Source (b) Electronic Device (c) Load (d) Protective device

Q17. BJT operates in Which region when acting as switch—(a) Active (b) Breakdown (c) Cut off & Saturation (d) None of the above

Q18. BJT operates in Which region when acting as amplifier —(a) Active (b) Breakdown (c)Cut off (d) Saturation (e) None of the above

Q19. In Which of the following **2nd Breakdown** happens –(a) Small Signal Diode (b) Small Signal BJT (c)Power BJT (d) Power MOSFET (e) None of the above

Q20. Which of the following is **False** about SCR—(a) Current can flow in both direction,provided Gate is fired (b) Forward current can be maintained if gate is fired and then gate is Withdrawn (c) Current in SCR cannot flow in reverse direction (d) We should not exceed Voltage between anode & cathode above forward breakover voltage.

Q21.Two Transistor model is related to (a) Power Diode (b) Power Transistor (c) Power MOSFET

Q22. RC Snubber is connected—(a) across supply (b) across SCR (c) in series with SCR (d) In series with load.

Section-B

Q1. Draw the symbol/circuit of following,**(i) pnp** transistor (ii) **npn** Transistor in common emitter mode(iii)SCR (IV) n Channel MOSFET(E Type) (V) DIAC(VI) TRIAC **[3]**

Q2. Plot the Input and Output Characteristic of **npn BJT** in **Common Emitter** Mode**. [3]**

Q3. An SCR connects an AC source to resistive load as shown in fig. Supply voltage is **V(t) =311 Sinωt , ω=314 rad/sec, R=5 Ω .** Find average voltage, RMS voltage across load Resistance at Firing angle **30º** **[4]**

Q4. Compare the Linear Regulated DC Power Supply and Switched mode DC Power Supply With respect to construction ,advantage ,limitation and other feature. **[4]**

OR

Q4. With a neat circuit diagram explain how Shunt Regulator works . **[4]**

Q5. Plot/Draw Static I-V characteristic of an SCR at different gate current .Also explain the different regions of this graph for their behavior. **[3]**

Q6. With a neat circuit diagram explain What device will you connect **with SCR For (a) dv/dt protection (b) di/dt protection** **[3]**