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## ***B.Tech. Degree II Semester Regular/Supplementary Examination in Marine Engineering June 2022***

### **19-208-0204 BASIC ELECTRONICS AND MEASUREMENTS (2019 Scheme)**

Time: 3 Hours

Maximum Marks: 60

**Course Outcome**

On successful completion of the course, the students will be able to:

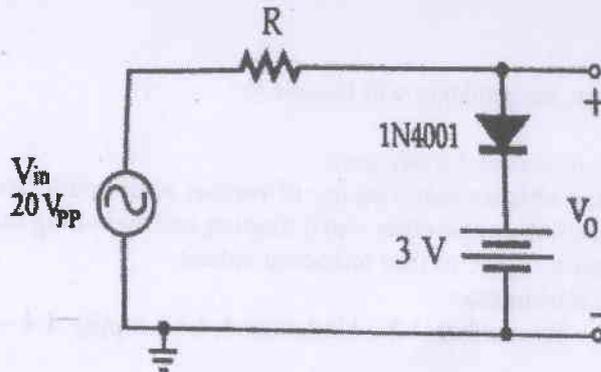
- CO1: Characterise semiconductors, diodes and transistors.  
 CO2: Explain the construction, characteristics and working of various semi-conductors devices.  
 CO3: Understand the working of oscillators and other wave shaping and switching circuits.  
 CO4: Use different meters and balance bridge to find unknown values.  
 CO5: Use digital voltmeters, CRO, multimeters.  
 Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze,  
 L5 – Evaluate, L6 – Create  
 PO – Programme Outcome

		(5 × 15 = 75)	Marks	BL	CO	PO
I.	(a) Explain about Intrinsic and Extrinsic semiconductors.		4	L1	1	1.3.1
	(b) Explain the working of full wave rectifier using centre-tap transformer with necessary figure and derive the expression for rectification efficiency. Compare any four parameters of full wave centre tap rectifier and half wave rectifier.		5	L2	1	2.2.3
	(c) Draw the Common Base transistor (CB) configuration circuit and describe the working along with equations about its current amplification factor and collector current. Draw its input and output characteristic curve.		6	L2	1	1.3.1
<b>OR</b>						
II.	(a) Describe the following terms in semiconductors with necessary equations: (i) drift current (ii) diffusion current (iii) Mobility (iv) conductivity.		4	L1	1	1.3.1
	(b) Describe voltage divider biasing with diagram and all loop equations. Comment on its Stability factor.		5	L2	1	2.2.3
	(c) What are the conditions for different regions of operations of a transistor? Explain the working of an NPN Transistor with necessary figures. Also draw the output characteristics of CE transistor and mark all regions of operation.		6	L2	1	1.3.1
III.	(a) Explain the working of Silicon controlled rectifier (SCR) along with its 4 modes of operation and draw its characteristics.		7	L2	2	1.3.1
	(b) Draw the diagram and describe in detail about the working of (i) Simple zener controlled voltage regulator (ii) Transistor series voltage regulator		8	L2	2	1.3.1
	<b>OR</b>					
IV.	(a) Draw the circuit diagram of RC coupled amplifier and explain its operation, frequency response curve, 3dB line and its significance.		7	L2	2	1.3.1
	(b) Explain the construction, working and characteristics of (i) Enhancement type MOSFET (ii) N-channel JFET.		8	L2	2	1.3.1

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- |   | Marks | BL | CO | PO    |
|---|-------|----|----|-------|
| V. (a) What is Barkhausen criteria? Explain in detail about Wein Bridge oscillator along with circuit diagram, working and frequency of oscillation expression. | 9     | L2 | 3  | 2.2.3 |
| (b) Identify the circuit and explain the working of it with necessary output voltage equations considering the diode as ideal. Sketch the output waveform.      | 6     | L3 | 3  | 1.3.1 |



OR

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|--|----|----|---|-------|
| VI. (a) Explain the working of astable multivibrator with neat diagram and applications. Comment on stable states of astable, monostable and bistable multivibrators.  | 9  | L2 | 3 | 2.2.3 |
| (b) When a triangular wave input is given to a RC differentiator and an RC integrator respectively what will be the output? Explain the operation of RC differentiator with circuit diagram and derive the output voltage equations. | 6  | L3 | 3 | 1.3.1 |
| VII. (a) Explain the construction, working principle and torque equation of PMMC instruments.  | 10 | L1 | 4 | 2.2.3 |
| (b) A MC instrument gives a FSD of 10mA when the potential difference across the terminals is 100mV. Calculate<br>(i) The shunt resistance for FSD corresponding to 100A<br>(ii) The series resistance for FSD with 1000 V.          | 5  | L3 | 4 | 1.3.1 |
| OR   |    |    |   |       |
| VIII. (a) Explain the construction, working principle of single phase induction type energy meter.   | 10 | L1 | 4 | 2.2.3 |
| (b) Explain how ammeter and voltmeter range extension is done.   | 5  | L2 | 4 | 1.3.1 |
| IX. (a) Explain in detail the block diagram of a general purpose CRO.  | 10 | L2 | 5 | 4.1.3 |
| (b) Explain the measurement of temperature using transducers.  | 5  | L2 | 5 | 4.1.3 |
| OR   |    |    |   |       |
| X. Explain the construction and working of multimeter.   | 15 | L2 | 5 | 4.1.3 |

Bloom's Taxonomy Levels

L1 - 19%, L2 - 66%, L3 - 14%

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