	Level		
	A	B1	B2
4.1 **Semiconductors**			
4.1.1 **Diodes**			
(a)	—	2	2
Diode symbols;			
Diode characteristics and properties;			
Diodes in series and parallel;			
Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes;			
Functional testing of diodes.			
(b)	—	—	2
Materials, electron configuration, electrical properties;			
P and N type materials: effects of impurities on conduction, majority and minority characters;			
PN junction in a semiconductor, development of a potential across a PN junction in unbiased, forward biased and reverse biased conditions;			
Diode parameters: peak inverse voltage, maximum forward current, temperature, frequency, leakage current, power dissipation;			
Operation and function of diodes in the following circuits: clippers, clampers, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers;			
Detailed operation and characteristics of the following devices: silicon controlled rectifier (thyristor), light emitting diode, Shottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.			
4.1.2 **Transistors**			
(a)	—	1	2
Transistor symbols;			
Component description and orientation;			
Transistor characteristics and properties.			
(b)	—	—	2
Construction and operation of PNP and NPN transistors;			
Base, collector and emitter configurations;			
Testing of transistors.			

	Level		
	A	B1	B2
Basic appreciation of other transistor types and their uses. Application of transistors: classes of amplifier (A, B, C); Simple circuits including: bias, decoupling, feedback and stabilisation; Multistage circuit principles: cascades, push-pull, oscillators, multivibrators, flip-flop circuits.			
4.1.3 **Integrated Circuits**			
(a)	—	1	—
Description and operation of logic circuits and linear circuits/operational amplifiers.			
(b)	—	—	2
Description and operation of logic circuits and linear circuits; Introduction to operation and function of an operational amplifier used as: integrator, differentiator, voltage follower, comparator; Operation and amplifier stages connecting methods: resistive capacitive, inductive (transformer), inductive resistive (IR), direct; Advantages and disadvantages of positive and negative feedback.			
4.2 **Printed Circuit Boards**	—	1	2
Description and use of printed circuit boards.			
4.3 **Servomechanisms**			
(a)	—	1	—
Understanding of the following terms: Open and closed loop systems, feedback, follow up, analogue transducers; Principles of operation and use of the following synchro system components/features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters.			
(b)	—	—	2
Understanding of the following terms: Open and closed loop, follow up, servomechanism, analogue, transducer, null, damping, feedback, deadband; Construction operation and use of the following synchro system components: resolvers, differential, control and torque, E and I transformers, inductance transmitters, capacitance transmitters, synchronous transmitters; Servomechanism defects, reversal of synchro leads, hunting.			