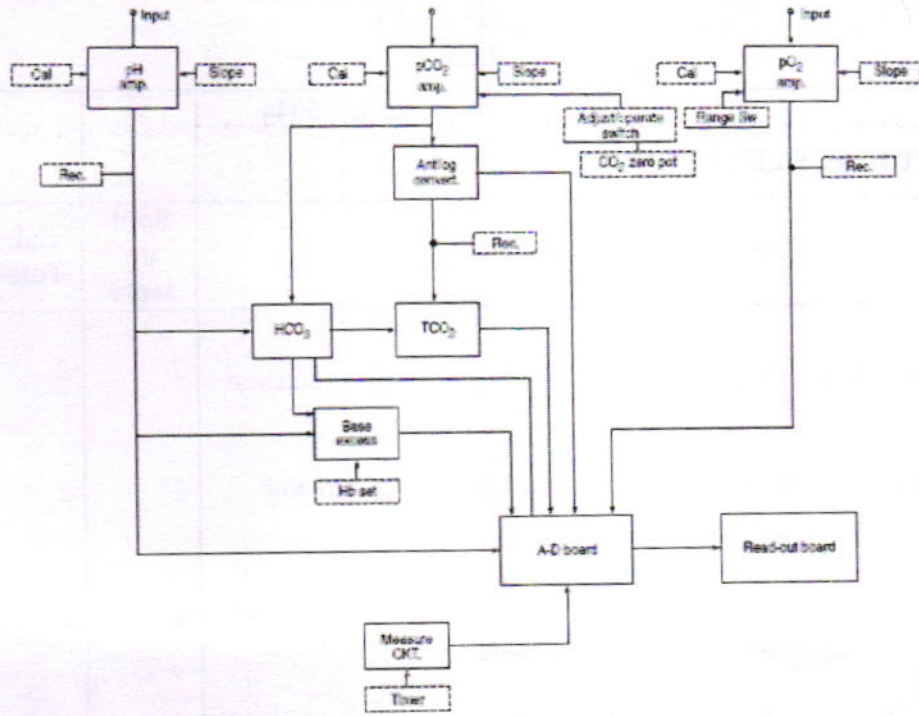


D 11

**SCHEME OF VALUATION**  
**(Scoring indicators)**

Qst. No.	Scoring Indicator	Split up score	Sub Total	Total
B	Revision : 2015 Course Title : <b>MEDICAL ELECTRONICS</b>	Course Code: 5044		
PART A				
1	Bipolar Leads, Unipolar Leads (V Leads), Precordial leads, Augmented chest leads ( <i>any two</i> )	2	2	2
2	Direct method (percutaneous insertion, catheterisation, implantation) and Indirect method (korotkoff sound) ( <i>any two</i> )	2	2	2
3	If sino-atrial node ceases to function or becomes unreliable If the triggering pulse does not reach the heart muscle because of blocking by the damaged tissues	2	2	2
4	Capability to penetrate matter coupled with differential absorption Ability to produce luminescence and its effect on photographic emulsions	2	2	2
5	Study of proton imaging of internal human anatomy- discrimination of soft tissues- observing myocardium- assess heart diseases- measurement of blood flow- discriminating waver and lipids ( <i>any two</i> )	2	2	2
PART B				
1	<p>The membrane of excitable cells permits entry of potassium and chloride ions - blocks the entry of sodium ions. Because of the concentration imbalance of potassium ions, equilibrium is reached with a potential difference across the membrane, negative on the inside and positive on the outside. This membrane potential is called the <b>resting potential</b>.</p> <p>When cell membrane is excited by the flow of ionic current or by some external energy, the membrane changes its characteristics and begins to allow some of the sodium ions to enter. Then the cell has a slightly positive potential on the inside due to the imbalance of potassium ions. This potential is known as action potential.</p>	6	6	6



2

3 Treatment of detached retina- Coagulation in diabetic retinopathy (coagulation of lesions in the retina)- Neuro-surgery (treatment of tissue in the skull and spine)- Gastro-entrolgy (treatment by coagulation of the lower gastrointestinal tract)- Dermatology (removal of skin imperfections by laser irradiation)- Ear, nose and throat surgery.

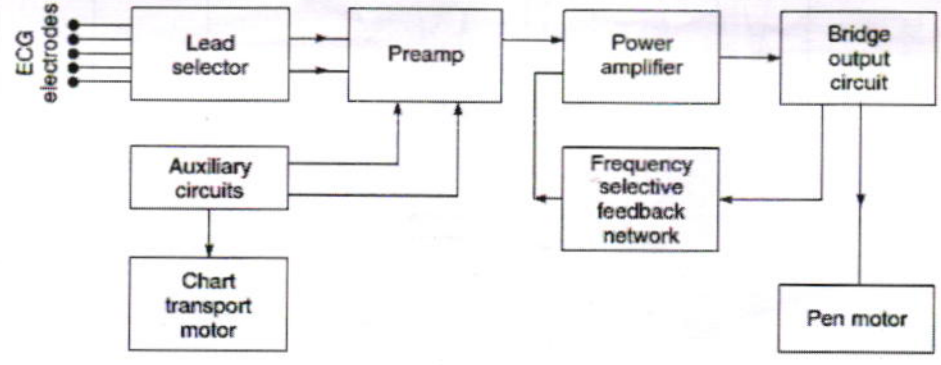
4 Asynchronous contraction of the heart muscles- Coronary occlusion - Electric shock - Abnormalities of body chemistry. Heart muscle fibres are continuously stimulated by adjacent cells so that there is no synchronized succession of events that follow the heart action. Consequently, control over the normal sequence of cell action cannot be captured by ordinary stimuli.

5 Single chamber (unipolar) pacemaker: - Lead placed in atrium or ventricle/ Produce large spic on the ECG/ Sensing and pacing in the chamber where the lead is located/ More likely to be affected by electromechanically interference  
 Dual-chamber (bipolar) pacemaker: - One Lead located in the atrium and one in the ventricle/ Sensing and pacing in both chambers mimicking the normal heart function/ Produce in visible spic in the ECG/ Less affected by electromechanical interference

6 A **magnet**, which provides a strong uniform, steady, magnet field- An **RF transmitter**, which delivers radio-frequency magnetic field to the sample- A

6	6	6
1 (for each)	6	6
6	6	6
3	6	6
3		
6	6	6

	<p><b>gradient system</b>, which produces time-varying magnetic fields of controlled spatial nonuniformity- A <b>detection system</b>, which yields the output signal- An <b>imager system</b>, including the computer, which reconstructs and displays the images.</p>			
7	<p>Macroshock: current spreads through the body- Patients in medical-care facilities are much more susceptible to macroshocks</p> <p>Microshock: all current flows through the heart- Patient is only in danger of microshock if there is some electric connection to the heart – result from leakage currents in line operated equipment</p>	6	6	6

III a	<p>PART C</p>  <p>The potentials picked up by the patient electrodes are taken to the lead selector switch. By means of capacitive coupling, the signal is connected symmetrically to the long-tail pair differential preamplifier. The preamplifier is usually a three or four stage differential amplifier having a sufficiently large negative current feedback, from the end stage to the first stage, which gives a stabilizing effect. The amplified output signal is picked up single-ended and is given to the power amplifier. The power amplifier is generally of the push-pull differential type. The base of one input transistor of this amplifier is driven by the preamplified unsymmetrical signal. The base of the other transistor is driven by the feedback signal resulting from the pen position and connected via frequency selective network. The output of the power amplifier is single-ended and is fed to the pen motor, which deflects the writing arm on the paper. A direct writing recorder is usually adequate since the ECG signal of interest has limited bandwidth. Frequency selective network is an R-C network, which provides necessary damping of the pen motor and is preset by the manufacturer. The auxiliary circuits provide a 1 mV calibration signal and automatic blocking of the amplifier during a change in the position of the lead switch. It may include a speed control</p>	5	9	9
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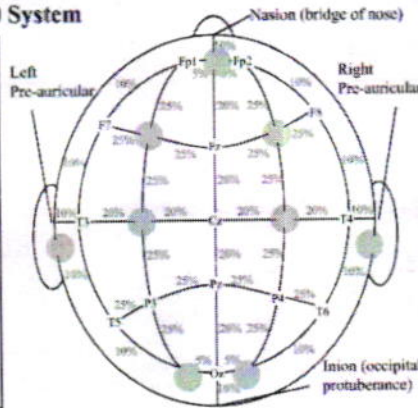
circuit for the chart drive motor.

III b The system is based on the relationship between the location of an electrode and the underlying area of cerebral cortex. The "10" and "20" refer to the actual distances between adjacent electrodes are either 10% or 20% of the total front-back or right-left distance of the skull. Each site has a letter to identify the lobe and a number to identify the hemisphere location- frontal, temporal, central, parietal, and occipital lobes, respectively.

**International 10/20 System**

The following EEG electrode sites are used in a standard overnight sleep study:

- F3
- F4
- C3
- C4
- O1
- O2
- M1
- M2
- FpZ



3

6

6

3

IV a **Electrodes for ECG:**

Limb Electrode: rectangular or circular surface electrodes- material used is german silver, nickel silver or nickel plated steel- applied to the surface of the body with electrode jelly

Floating Electrode: in which the metal electrode does not make direct contact with the skin- consists of a light-weight metallised screen or plate held away from the subject by a flat washer which is connected to the skin.

Floating electrodes can be recharged

Pregelged disposable electrodes and pasteless electrodes

**Electrodes for EEG:** surface electrode, suction electrode, needle electrode

**Electrodes for EMG:** usually of the needle type- Needle electrodes are used in clinical electromyography, neurography and other electrophysiological investigations of the muscle tissues underneath the skin and in the deeper tissues. The material of the needle electrode is generally stainless steel.

Types- monopolar, bipolar, concentric

**Microelectrodes-** Glass microcapillary electrode, Metal microelectrode,

2 for each applic ation/t ype

8

8