Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: VI (BM&I) Engineering

Regular Examination April – June 2016

2BM602 – Biopotential & Recorders

Time: 3 Hours **Total Marks: 70**

Instruction:
1. All Questions are compulsory
2. Answer to question of each section must be written in separate answer book
3. Figures to right indicate marks
4. Assume suitable data if necessary

Section - I

Que. – 1 [12]

(a) Explain Electro Nystagmography technique in detail. 4

(b) Describe the basic Instrumentation Scheme used for EOG and ERG. 4

(c) Explain right leg driven technique in detail. 4

OR

Que. – 1 [12]

(a) Explain myographic integrators in detail. 4

(b) Calculate the common mode voltage at the right leg driven circuit when I_d =700nA. 4

(c) Draw and explain the Block diagram of ECG. 4

Que. – 2 [11]

(a) Write short note on applications of EEG. 3

(b) Mention which devices are used for the over load protection? Explain their working. 3

(c) What is the use of Isolation Amplifier? 2

(d) Draw the 10-20 placement system used for EEG. 3

OR

Que. – 2 [11]

(a) Draw the instrumentation scheme for EEG and explain the lead configuration of the EEG. 4

(b) Differentiate between rods and cones. 3

(c) Mention the frequency and amplitude of ECG, EMG, EOG and ERG signal. 4

Que. – 3 Write short note on following: [12]

(a) Saccadic Eye movement. 4

(b) Abnormal EEG. 4

(c) Lead Configuration of ECG. 4

Section – II

Que. – 4 [12]

(a) Design the equivalent electrical circuit network for following ion channels: H^+, Ca^{2+}, Cl^- and Na^+. Why it is important to develop the electrical circuit for ion channels and what are the primary findings that can be obtained from it? 6

(b) Explain the process of conduction of action potential in nerve cells. 6

OR

Que. – 4 [12]

(a) What is Goldman-Hodgkin-Katz equation for conductance of ion channel? How it differs from Nernst equation? Explain the physiological importance of GHK equation 6

(b) Describe in detail the setup to measure action potential with necessary diagram. 6

Que. – 5 [11]

(a) Write short note on Skeletal muscles and enlist the functions of skeletal muscles 5

(b) For given typical three ion Na+, K+ & Cl- the inside concertation for Na+, K+ & Cl- are 430, 55, 42 respectively and outside concentration for the same is 14, 465, 550. 6
The membrane permeability is as under:
At resting state → $P_{Na}:P_K:P_{Cl} = 1:0.05:0.1$
Calculate the RMP using Goldman's equation. What change in RMP will happen if permeability of K+ ion channel is doubled?

OR

Que. – 5 [11]

(a) Define active and passive diffusion. Explain briefly the following: 5
(i) Ohm's law of Diffusion
(ii) Fick's law of Diffusion

(b) Explain the origin of action potential and explain it stage wise considering active Na/K pump. 6

Que. – 6 [12]

(a) Derive the mathematical equation to obtain resting membrane potential (RMP) using Hodgkin Huxley model. 6

(b) Describe physiology of muscles contraction using "walk alone" theory. What is role of acetylcholine in muscle contraction? 6

END OF PAPER