PUNJAB PUBLIC SERVICE COMMISSION

COMBINED COMPETITIVE EXAMINATION FOR RECRUITMENT TO THE POSTS OF PROVINCIAL MANAGEMENT SERVICE, ETC -2022

CASE NO. 2C2023

SUBJECT: PHYSICS (PAPER-II)

TIME ALLOWED: THREE HOURS **MAXIMUM MARKS: 100**

NOTE:

i. All the parts (if any) of each Question must be attempted at one place instead of at different places.
ii. Write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.
iii. No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
iv. Extra attempt of any question or any part of the question will not be considered.

NOTE: Attempt Five Questions in All. Calculator is allowed (Non-Programmable). Attempt in Urdu or English.

Q. No. 1:
a) State and explain Ampere's Law of magnetic field on considering a straight current carrying conductor.
b) How you can determine the value of magnetic field inside a current carrying Solenoid by employing Ampere's Law? **(10+10=20 Marks)**

Q. No. 2:
a) What is Transient current? Derive its expression for an LR circuit.
b) What is Time Constant of an LR circuit?
c) How much percent of maximum current will appear in LR circuit after 5 Time Constants? **(10+4+6=20 Marks)**

Q. No. 3:
a) Differentiate between the mechanism of current flow through npn and pnp transistors.

b) What is an amplifier? Describe in detail the transistor as an amplifier using a common-emitter configuration. **(6+14 =20 Marks)**

Q. No. 4:
a) What is a NAND gate? Write its truth table, logic equation and logic operation. Draw and explain its switch equivalent. Why NAND and NOR gates are called universal gates? Explain with appropriate example.

b) What is De Morgan's theorem? Explain its significance. Describe briefly how De Morgan's theorem is applied in the simplification of a Boolean expression. **(12+8=20 Marks)**

Q. No. 5:
a) What is Photoelectric Effect? Explain the experimental results of Photoelectric set-up.
b) Describe the followings:
i) Threshold frequency
ii) Work Function of a metal
iii) Einstein's equation of Photoelectric Effect
iv) Stopping Potential

(12+8=20 Marks)

Q. No. 6:
a) Derive Time dependent and Time Independent Schrodinger's wave equations. What is the importance a wave function?
b) Solve Schrodinger's wave equation for a particle trapped in one dimensional box.
(10+10=20 Marks)

Q. No. 7:
a) What do you mean by mass defect and binding energy of a nucleus? How does binding energy per nucleon vary as a function of mass number?

b) State radioactive law. How will you find the mean life time of a radioactive element? Prove that mean life time of a radioactive element is always greater than its half-life.
(10+10=20 Marks)

Q. No. 8:
a) What do you mean by radioactive decay? Discuss theory of alpha-decay in detail.

b) Define half-life of a radioactive element. Derive an expression to find the half-life of a radioactive element.

c) Explain the reason that nuclei with high mass numbers tend to accommodate more neutrons than protons. **(8+8+4=20 Marks)**
