UNIVERSITY OF THE PUNJAB
Part-II : Supplementary Examination 2018
Examination:- M.A./M.Sc.

Roll No. ....

Subject: Space Science (New Course)
PAPER: I (Astrophysics and Cosmology)

MAX. TIME: 3 Hrs.
MAX. MARKS: 100

NOTE: ***Attempt any FIVE questions selecting at least TWO questions from each section. All questions carry equal marks.***

Section-I

Q1. (a) Write a comprehensive note on physical structure of stars?   [10]
   (b) Drive equation of radiative transfer.   [10]

Q2. (a) Write a note on Black Holes.   [10]
   (b) What is nuclear energy? How it is produced?   [10]

Q3. (a) Explain atomic processes of absorption, spontaneous emission, stimulated emission, collisional excitation and de-excitation.   [10]
   (b) Explain the method of classification of stars.   [10]

Q4. Calculate orbital energy of an electron in terms of fine structure constant.   [20]

Section-II

Q5. Write a note on first three minutes of the universe.   [20]

Q6. Derive the Friedmann equation in Newtonian form.   [20]

Q7. What is cosmological constant? Explain its role in the expanding universe.   [20]

Q8. Explain different types of galaxies.   [20]

Q9. Write notes on any two of the following: [10+10]

   (i) Big bang theory
   (ii) The acceleration equation

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PAPER: II (Electrodynamics and Space Plasma)

MAX. TIME: 3 Hrs.
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NOTE: Attempt any FIVE questions selecting at least TWO questions from each section. All questions carry equal marks.

SECTION-I

Question No 1 (20)
Find the value of intrinsic impedance when *neither conductivity nor dielectric* constant is ignored. Also prove that in case of conducting media the attenuation is directly proportional to square root of frequency.

Question No 2 (20)
Discuss the propagation techniques for good dielectric and good conducting media.

Question No 3 (20)
Explain the concept of scalar potential and vector potential and explain how wave equations can be expressed in terms of scalars potential and vector potential?

Question No 4 (20)
Discuss the solution of Maxwell's equations for non-conducting media by using the concept of uniform plane wave.

SECTION-II

Question No 5 (20)
What is Debye Shielding? Prove that Debye length is directly proportional to square root of frequency.

Question No 6 (20)
Prove that drift velocity in case of varying electric field is directly proportional to Larmour radius.

Question No 7 (20)
State and explain fluid equation of motion and discuss stress tensor.

Question No 8 (20)
Prove that phase velocity and group velocity are same for an Ion Acoustic wave.

Question No 9 (20)
Discuss the behavior of charge particles in uniform electric and magnetic field and also discuss the physical significance.