DH-003-001601 Seat No. _____

B. Sc. (Sem. VI) (CBCS) Examination

March-2022

Physics : 601

(Nuclear Physics & Space Physcis)

Faculty Code : 003

Subject Code : 001601

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All the questions are compulsory.

(2) Figures to the right indicates marks.

(3) Non-programmable scientific calculator is allowed.

1 Answer the following in short : **20**

(1) Which particle is accelerated by using cosmotron ?

(2) In synchro-cyclotron, phase focussing is used to overcome _____ (fill in the blanks)

(3) $zX^{A} + 1H^{1} \rightarrow$ _____ $+ 2He^{4}$

(4) Calculate the energy release in fissioning of 1 kg of uranium in Mev.

(5) What is the common name of Nucleon & Hyperons?

(6) In case of gamma ray absorption if energy of photon exceeds _____ the pair production is occurred.

(7) For GM counter in plateau region counting rate is almost independent of _____ (fill in the blanks)

(8) For a multiplication factor K<1, the chain reaction is said to be _____ (fill in the blanks)

(9) Give the eqn for Q-value for nuclear reaction $A + B \rightarrow x + y$ (where target B stationary).

(10) What is spectral reflectance ? Give its formula.

(11) From the evidence provided through observation how many galaxies are there in the universe ?

(12) The black-hole having mass range 1.4-3 to 15-20 solar masses is known as _____ (fill in the banks)

(13) Which particle acquires non-zero strangeness number ?

(14) What is the luminosity of a star whose output power is half the power output of the sun ?

(15) The brightness of our sun is about_____watt.

(16) The birth of a star is due to dense cloud having diameter about_____light year.

(17) How much times absolute brightness of the Rigel and Denel stars is there compare to the sun ?

(18) What will be the color of star having temp. Range 2000^0-3000^0k ?

(19) What will be the color of star if it contains natural He & H ?

(20) In which type of supernova hydrogen line is absent and helium line are weak or not present ?

2 (A) Answer the following (any **three**) **6**

(1) Explain photo disintegration.

(2) What is pair production ?

(3) Discuss conservation of mass energy.

(4) What is the principle of Betatron ?

(5) Write the use of Ionization chamber.

(6) Draw the diagram of Tolamak.

2 (B) Answer the following in detail (any **three**) : **9**

(1) Describe Compton effect.

(2) What is threshold energy ? Derive its formula.

(3) Draw characteristics of GM counter and analyses it.

(4) Determine the product nuclei and Q-value in Mg25 (α, d) reaction, masses of Mg25 α and d are 24.9936, 4.0039, 2.0147,

(5) What are the causes of neutron loss in nuclear reaction ?

(6) What is critical sie of nuclear reactor ?

(C) Answer any **two** in detail : **10**

(1) Explain magnetic confinement by takamak.

(2) Explain construction and working of proton synchrotron.

(3) Describe GM counter and explain its working as particle detector.

(4) Explain with examples the types of nuclear reactions.

(5) Explain Bohr and wheelers theory of nuclear fission.

3 (A) Answer any **three** in brief : **6**

(1) Which are the main group of elementary particles?

(2) What are the estimated masses of white dwarfs?

(3) Why clouds appears ?

(4) Why quarks in hydrogen have different colors ?

(5) What is remote sensing ?

(6) Which is noticeable event occur in red giant ?

(B) Answer any **three** : **9**

(1) What is the quarks model Σ^{+} ; Σ^{0} and Σ^{--}

(2) What is the function of fourth satellite in GPS ?

(3) Explain various generations of quarks.

(4) What is super sensor ?

(5) Explain anti-matter.

(6) Describe the energy interactions in the atmosphere by the mechanism of scattering ?

(C) Answer any **Two** in detail : **10**

(1) What is Herzprung Russell diagram ? Discuss different sequences of stars.

(2) Explain Back-Hole.

(3) Explain brightness of stars.

(4) Explain Steller spectra in detail.

(5) Explain conservation laws in elementary particles.
