



RX-003-001601

Seat No. _____

B. Sc. (Sem. VI) Examination

March - 2019

Physics : Paper - 601

(Nuclear Physics & Space Physics)

(Old Course)

Faculty Code : 003

Subject Code : 001601

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

Instructions :

- (1) Attempt **all** the questions.
- (2) Figures on right side indicate marks.
- (3) Notations have their usual meanings.

1 All questions are compulsory : 20

- (1) Betatron is a device to accelerate _____ to very high energies.
- (2) Which accelerator consists of only one "DEE" placed in a vacuum chamber ?
- (3) In which accelerator a magnetic lens focussing system available ?
- (4) In process of pair production a high energy photon is converted into _____ pair.
- (5) The principle of GM counter is charged particle can ionize gases. (True / False)
- (6) What is the Q-value of a nuclear reaction of K.E. of projectile, product and out going particles are E_2 - E_3 and E_4 respectively ?

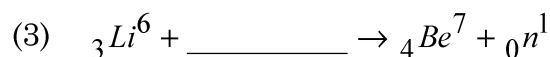
- (7) The reaction ${}_3\text{Li}^6 + {}_0n^1 \rightarrow {}_1\text{H}^3 + {}_2\text{He}^4$ is known as _____ reaction.
- (8) Give the general reaction of (p, α)
- (9) In one fission of uranium about _____ MeV energy is released.
- (10) Bohr and Wheeler explain the nuclear fission using _____ model.
- (11) When $K < 1$ the chain reaction will be subcritical.
(True / False)
- (12) D_2O is used as _____ in nuclear reactor.
- (13) Write the reaction of fusion process.
- (14) Give the names of plasma confinement methods.
- (15) Give the names of types of neutrino(ν)
- (16) Our Sun shines with a power out put of _____ watt.
- (17) Rigel is estimated to be _____ times as big as Sun.
- (18) What is the temperature range of Red Star ?
- (19) Give the full name of HR diagram.
- (20) What is the full form of GPS ?

2 (a) Answer any **three** of the following questions : 6

- (1) What is the principle of betatron ?
- (2) Describe photoelectric effect.
- (3) Explain pair production.
- (4) What is photo-disintegration ?
- (5) Discuss : (n, 2n) reaction.
- (6) Give typical example of fission reaction.

(b) Answer any **three** of the following questions : 9

- (1) Describe the construction of betatron.
- (2) Discuss : Absorption of γ -rays.
- (3) Explain the interaction of electron with matter.
- (4) Explain Rutherford's experiment for artificial transmutation.
- (5) What is the difference between (α, P) and (P, α) reaction ?
- (6) Complete the following nuclear reaction.



(c) Answer any **two** of the following questions : 10

- (1) Write note on proton synchrotron.
- (2) Describe construction and working of G.M. Counter.
- (3) Describe conservation laws in nuclear reaction.
- (4) Derive equation of Q-value in nuclear reaction.
- (5) Describe the main elements of nuclear reactor.

3 (a) Answer any **three** of the following questions : 6

- (1) Give the uses of nuclear reactor.
- (2) Give the names of particles which are known as mesons.
- (3) Describe Lepton number.
- (4) Draw a spectrum of a blue coloured star.
- (5) Describe irregular galaxies.
- (6) Which are the major causes of Mie scatter ?

(b) Answer any **three** of the following questions : **9**

- (1) Give the classification of hadrons.
- (2) Write note on anti-matter.
- (3) Discuss : Birth of star.
- (4) Draw H.R. diagram.
- (5) Which are the elements of remote sensing process ?
- (6) Why fog and clouds appear white ?

(c) Answer any **two** of the following questions : **10**

- (1) Explain the quarks model for mesons and nucleons.
- (2) Describe the fundamental interactions.
- (3) Write note : Black hole.
- (4) Explain white dwarfs.
- (5) Explain energy sources and radiation principles.
