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**PF-003-001601** Seat No. _____

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

**July - 2018**

## Physics : Paper - 601

***(Nuclear Physics and Space Physics)***

***(New Course)***

**Faculty Code : 003**

**Subject Code : 001601**

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

**Instructions :** (1) All questions are compulsory.

(2) Symbols have their usual meaning.

(3) Figures on right side indicate full marks.

**1** Answer in brief : **20**

(1) Which accelerator contains a magnetic lens focusing system?

(2) Which accelerator consist four segments of magnet and four equal straight segments?

(3) The voltage characteristic of a GM Counter is a plot of the _____ against the counter potential.

(4) What is called the part of the curve of voltage characteristic of GM counter which is almost parallel to the potential axis?

(5) Who demonstrated the first artificial transmutation?

(6) Which type the reaction, $A + X \rightarrow B + Y + Q$, is if Q is positive?

(7) If the reaction is elastic scattering, then $A + X = ?$

(8) How many neutrons are released when the nucleus of uranium splits into $_{56}Ba^{141}$ and $_{36}Kr^{92}$?

(9) In a chain reaction, number of neutrons produced in each successive fission are 3, 9, 27, 81,... What will be the multiplication factor?

(10) Breeder reactor is also known as _____ reactor.

(11) A completely ionized and electrically neutral state of matter is called _____

(12) Nucleons and hyperons are jointly called _____

(13) What is the short name of $\pi$ – meson?

(14) $e^+ + e^- = ?$

(15) Third generation quarks are _____ and _____

(16) The Sun is found on the _____ in H R diagram.

(17) A _____ is a stellar explosion.

(18) A _____ star is so dense that one tea spoon of the material would have a mass over $5 \times 10^{12} Kg$.

(19) Water vapour and dust are major causes of _____ scatter.

(20) The U. S. GPS includes a group of _____ satellites rotating round the earth in known orbits.

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

(1) Draw a simple structural diagram of betatron.

(2) Which Parts a synchrocyclotron contains?

(3) Write the expanded form $_{79}Au^{197}\ (\alpha, \alpha)\ _{79}Au^{197}$.

(4) Give the example of $(n, \propto)$ reaction.

(5) What is breeding?

(6) What are the types of chain reactions?

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

(1) Describe the construction and working of proton synchrotron.

(2) Explain principle and construction of ionization chamber.

(3) Discuss energy balance in nuclear reaction.

(4) Find the Q–value of $Mg^{25}(\propto, d)\, Al^{27}$ reaction.

Given : Atomic masses of $Mg^{25} = 24.9936$ amu, $He^{2} = 4.0039$ amu, $Al^{27} = 26.9901$ amu, $H^{2} = 2.0147$ amu.

(5) Describe energy released in fission.

(6) Describe self–sustaining chain reaction.

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

(1) Explain alternating gradient accelerator.

(2) Describe principle, construction and working of scintillation counter.

(3) Give illustrations of $(\propto, n), (p, \propto), (d, \propto)(d, p)$ and $(d, n)$ reactions

(4) Describe source of stellar energy.

(5) Explain fast breeder reactor.

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

(1) Discuss Neutrino.

(2) Give the names of fundamental interactions.

(3) Draw a spectrum of blue coloured star.

(4) Describe supermassive black hole.

(5) Which are the two divisions of remote sensing process?

(6) Explain super sensor.

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

(1) Explain neutrino and antineutrino.

(2) Describe baryon number B.

(3) Explain birth of star.

(4) Discuss formation of neutron star.

(5) Describe Rayleigh scattering in atmosphere.

(6) What are the minimum requirements for successful application of remote sensing?

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

(1) Give the classification of elementary particle hadrons.

(2) Explain the quark model for mesons and nucleons.

(3) Describe stellar spectra.

(4) Write note on white dwarfs.

(5) Describe the atmospheric windows.

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