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MAL-003-001601 Seat No. _____

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

March / April - 2018

Physics : Paper-601

(Nuclear Physics & 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) Right side indicate marks.

1 Answer in short : **20**

(1) Which particle is accelerated by using cosmotron ?

(2) In Synchro-cyclotron, phase focusing is used to overcome _____.

(3) In case of r-ray absorption if energy of photon exceeds _____ the pair production is occurred.

(4) For G.M. Counter in plateau region counting rate is almost independent of _____.

(5) Give the equation for Q-value for nuclear reaction A + B $\rightarrow$ x + y (where target B is stationary)

(6) Complete the (P, α) reaction

$$_zX^A + {}_1H^1 \rightarrow \_\_\_\_ + {}_2He^4$$

(7) Calculate the energy release in fissioning of 1 kg of uranium in MeV.

(8) For multiplication factor K > 1, the chain reaction is said to be _____.

(9) What is the common name of Nucleon and hyperons.

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

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

(12) The brightness of our sun is about _____ watt.

(13) The birth of a star is due to dense cloud having diameter about _____ light year.

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

(15) What will be the colour of star having temperature range 2000-3500°K ?

(16) What will be the colour of star if it contains natural helium and hydrogen ?

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

(18) The black-hole having mass range 1.4 – 3 to 15–20 solar masses is known as _____.

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

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

2 (a) Answer any **three** in short : **6**

(1) Explain Pair Production.

(2) Discuss conservation of mass-energy.

(3) What is the principle of Betairon ?

(4) Draw the diagram of tokamak.

(5) What is photo disintegration ?

(6) write uses of ionization chamber.

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

(1) Describe compton effect.

(2) Draw voltage characteristics of G.M. counter and analyze it.

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

(4) Determine the product nuclei and Q-value in Mg_{25} $(\alpha.d.)$ reaction, masses of Mg_{25}, α and d are 24.9936, 4.0039 and 2.0147 amu respectively.

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

(6) What is critical size of nuclear reactor ?

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

(1) Explain construction and working of proton synchrotron.

(2) Describe G.M. counter and explain its working as a particle detector.

(3) Explain with typical examples the types of nuclear reactions.

(4) Describe Bohr and Wheeler's theory of nuclear fission.

(5) Explain magnetic confinement by tokamak.

3 (a) Answer any **three** in short : **6**

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

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

(3) Which noticeable event occur in red giant ?

(4) What is remote sensing ?

(5) Why the quarks in a hydron have different colours ?

(6) Why fog and clouds appears white ?

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

(1) Describe the energy interactions in the atmosphere by the mechanism of scattering.

(2) What is called super sensor ?

(3) What is anti-matter ?

(4) Discuss the generations of quarks.

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

(6) What is the quarks model of $\sum^{+}$, $\sum^{o}$ and $\sum^{-}$?

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

(1) Explain conservation laws in elementary particles ?

(2) Explain brightness of star.

(3) What is stellar spectra ? Explain in detail.

(4) What is black-hole ? Classify them.

(5) What is Hertzprung Russell diagram ? Explain various sequences of stars.
