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AAG-003-001601 Seat No. ________

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

April/May – 2016

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) Write answers of all the questions in given answer sheet.

(3) Symbols have their usual meaning.

(4) Figures on right hand side indicates full marks.

1 Select the correct answer from the given options : **20**

(1) F.M. Cyclotron uses the principle of

(A) Phase stability (B) Angular stability

(C) Path difference stability (D) Time stability

(2) In the case of absorption of V-rays pair production occurs if the protons have an energy exceeding

(A) $2MoC^2$ (B) hv

(C) $\frac{MoC^2}{2}$ (D) $\frac{1}{2}mv^2$

(3) Which nuclear detectors has highest energy resolution?

(A) Scintillation counter (B) Ionization chamber

(C) Solid state detector (D) G.M. Counter

(4) Which quantity is not conserved in nuclear reaction ?

(A) Parity

(B) Momentum

(C) Magnetic dipole momentum

(D) Charge

(5) Which particle is more penetrating into the nuclei ?

(A) Deuterons

(B) Neutrons

(C) Protons

(D) Alpha

(6) The value of Q for the endothermic reaction is -

(A) Positive (B) Negative

(C) Negative integer (D) Positive integer

(7) During the fission production rate of neutron depends on

(A) r (B) $2\pi r$

(C) r^2 (D) r^3

(8) How much energy released by a fission for 1 kg of U^{235} ?

(A) $3.13\times10^{19}\,Mev$ (B) $3.13\times10^{26}\,Mev$

(C) $5.13\times10^{19}\,Mev$ (D) $5.13\times10^{26}\,Mev$

(9) Fast neutrons are thermalized by means of

(A) Reflector (B) Moderator

(C) Coolant (D) Fuel

(10) The chain reaction is in super critical state when

(A) $K<1$ (B) $K>1$

(C) $K=1$ (D) $K \leq 1$

(11) The existance of antiparticle for the electron was actually prodicted by

(A) Maxwell (B) Cork

(C) Dirac (D) Plank

(12) A quantity called hypercharge (y) is conserved in

(A) Electromagnetic interaction

(B) Gravitational interaction

(C) Strong interaction

(D) Weak interaction

(13) Stars which we are able to see is approximately

(A) 10^{21} (B) 10^{24}

(C) 10^{12} (D) 10^{11}

(14) In the Universe there are approximately

(A) 10^{11} *galaxies* (B) 10^{12} *galaxies*

(C) 10^{21} *galaxies* (D) 10^{24} *galaxies*

(15) Galaxies are claasified into various categories according to their

(A) Shapes (B) Characteristics

(C) Both (A) & (B) (D) Colour

(16) Our galaxy is of

(A) E_0 *type* (B) SB_a *type*

(C) S_b *type* (D) SB_b *type*

(17) Surface temperature of the star can be obtained by

(A) Spectrum

(B) Absolute magnitude

(C) Apparent magnitude

(D) Colour index

(18) The microwave portion of the spectrum is

(A) 0.6 μm to 0.7 μm

(B) 0.4 μm to 0.5 μm

(C) 0.7 μm to 1.3 μm

(D) 1.0 μm to 1.0 m

(19) The earth's ambient temperature is about

(A) 300 K (B) 273 K

(C) 30 K (D) -273°

(20) The Radar is

(A) Active system (B) Passive system

(C) Radioactive system (D) None

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

(1) Write the principle of Alternating Gradient accelerator.

(2) What is Threshold energy ?

(3) What is detector ?

(4) What is chain reaction ?

(5) Which are the elementary particles ?

(6) What is main sequence ?

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

(1) Explain Rutherford's experiment.

(2) Discuss nuclear fission in short.

(3) Write note on solid state detectors.

(4) Write a short note on Red Giant stars.

(5) Discuss briefly particles and antiparticles.

(6) What is remote sensing.

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

(1) Explain proton synchrotron with figure.

(2) Explain Ionization chamber with figure.

(3) Explain Elementary particle Quantum numbers.

(4) Explain Plasma confinement with necessary figures.

(5) Explain Data acquisition and interpretation.

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

(1) What is particle accelerator ?

(2) Define efficiency of the counter.

(3) What is the use of reflector in nuclear reactor ?

(4) Define antimatter.

(5) How stars are classified ?

(6) When energy incident on the earth surface which interactions are possible ?

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

(1) Write note on Photoelectric effect and compton effect.

(2) Write note on Liquid Drop model.

(3) Write note on Boiling Water reactor.

(4) Write note on Atom Bomb.

(5) Write note on Global Positioning System.

(6) Describe different types of Galaxies.

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

(1) Discuss synchrocyclotron with figure.

(2) Discuss the scintillation counter with figure.

(3) Derive the Q value equation for nuclear reaction.

(4) Discuss the energy interaction in the atmosphere.

(5) Describe applications of remote sensing.