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| **ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27** | | | | | | | |
| **B.Sc. PHYSICS - VI SEMESTER** | | | | | | | |
| **SEMESTER EXAMINATION: APRIL 2020** | | | | | | | |
| **PH6215- ASTRONOMY,ASTROPHYSICS AND NUCLEAR PHYSICS** | | | | | | | |
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| **Time- 2 1/2 hrs** | | |  | **Max Marks-70** | | |  |
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| **This paper contains two printed pages and three parts** | | | | | | | |

**PART A**

Answer any **four** questions. Each question carries 10 marks. (4x10= 40)

1. a) Mention any five windows to the universe and give one important feature of each window.

b) With the help of Schematic diagram of Cassegrain telescope, explain its advantages over          refracting telescope. (5+5)

2 .a) Differentiate between radiative zone and convective zone in sun. Which layer is called          visible part of sun? write a note about it.

b) Using virial theorem, show that a stable star is a bounded system. (6+4)

3. a) Obtain an expression for mean particle energy in a star.

b) Obtain an expression for photon diffusion time and estimate its value for sun. (3+7)

4.a) Explain different stages in the evolution of a star to reach white dwarf stage.

b) Explain cosmic microwave background radiation to substantiate big bang theory. (6+4)

5. a) Explain β decay with one example. With the help of Pauli’s neutrino hypothesis ,

explain β- ray spectra.

b) Define Q value of nuclear reactions. For a nuclear reaction A+B → C+D ,

write Q value equation. (7+3)

6. a) With necessary theory, describe the working of a cyclotron. Obtain an expression for the           maximum kinetic energy of a particle accelerated by it.

b) Differentiate between Leptons and hadrons. (8+2)

PH-6215-A

**PART B**

Solve any **Four**  problems. Each problem carries 5 marks. (4x5 = 20)

LΘ = 3.9X1026 watts, σ = 5.67X10-8 w/m2/K, Wien’s constant = 0.0029mK. MΘ = 2X1030kg,

 RΘ =7X108m , G = 6.67X10-11Nm2/kg2, 1pc = 3.08 x 1016m.

7. If a star’s spectrum peaks at a wavelength of 3548Ao and its luminosity s 26LΘ, calculate its     radius.

8. What s the total energy of a 5MΘ and 3RΘ star? (consider constant density model).

9. A particular emission line detected in the light from a galaxy has a wavelength shift 1.6λ     where λ is  proper wavelength of the line. If the galaxy is at a distance of 6400Mpc, calculate     Hubble’s constant. Hence find out the corresponding age of the universe.

10. The Schwarzchild radius of black hole is found to be 4x107Km. Find the mass of the black        hole. A spiral galaxy is rotating  around it with a radius of 12.5pc.Find out the orbital        velocity of  the galaxy.      .

11. Calculate the nuclear density of 6C12 and 92U235 nucleus. What is the inference?.(ro = 1.3fm).

12.The activity of C14 in a living wood is 16 disintegrations per minute per gram. C14 in a piece of       wood in an ancient house is found to be 13 disintegrations per minute per gram. What is       the age of the wood piece? T1/2 of C14 = 5760 years.

**PART C**

13. Answer any **five** questions. Each question carries 2 marks. (5x2 = 10)

a. An astronomer has two telescopes of 5” and 3” aperture. Which telescope has high light      gathering power compared to human eye? Explain.

b. Even though the star Sirius has intrinsic energy output much greater than that of sun, its     apparent magnitude is -1.4 whereas it is -26.45 for Sun. Explain.

c. Main sequence stars are in hydrostatic equilibrium. True or false? . Justify your answer.

d. Does the final stage of a star depends on its initial mass? Explain.

e. Differentiate between 1H1 and 1H2 with respect to their spin. What are they called?.

f. A Π+ meson is made up of 1 up and 1 down quark. What are its charge and spin values?.

PH-6215-A

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