Name: Enrolment No:	

UPES
End Semester Examination, December 2024

Course: Fundamental of Astrophysics	**Semester: 5th**
Program: B.Sc. Physics Hons.	**Time** : 03 hrs.
Course Code: PHYS 3022P	**Max. Marks: 100**

Instructions: Instructions: Explain all the answers with appropriate diagrams.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	What is the cosmological principle?	4	CO1
Q 2	How do black hole form? Briefly explain the singularity and the event horizon of a black hole.	4	CO1
Q 3	Briefly explain the spectral series of the Hydrogen atom.	4	CO2
Q 4	State the Hubble's Law and its limitations.	4	CO1
Q 5	The nearest star (Alpha Centauri) to our solar system is 4.29 light years away. How much is this distance in terms of Parsec?	4	CO4

SECTION B
(4Qx10M= 40 Marks)

Q 6	Explain astronomical unit Parsec? The angular diameter of the Sun is $1920''$. If the distance of the Sun from the Earth is $1.5 \times 10^{11} m$, What is the linear diameter of the Sun? (5+5)	10	CO4
Q 7	Describe the difference between the process of the conversion of small elements into heavier elements for example the Sun or a star 10 times more massive than the Sun.	10	CO2
Q 8	Write three essential properties of gravitational force? The intensity of the radio signal is 0.120 W/m^2 at 16.0 m from a transmitter. What is the intensity of the signal at 4.0 meter from the same transmitter? Or	10	CO4

	State Virial theorem and how we can estimate the mass of the nearby Galaxy by applying Virial theorem? (5+5)		
Q 9	State Kepler's law for planetary motion and derive the Kepler's third law. The moon is at 3.84×10^5 km from the Earth. Obtain its time-period of revolution in days. (5+5)	10	CO4

SECTION-C
(2Qx20M=40 Marks)

Q 10	Establish a relation between mass density and time-period of the neutron star. Calculate the density of crab pulsar if the time-period is 33 milliseconds. **(15+5)** Or How do Pulsar stars form? Describe the properties of pulsar stars with appropriate diagram. If a pulsar star has 1.4×10^{-3} millisecond time-period, then estimate the lower limit radius of a neutron star. (6+6+8)	20	CO2
Q 11	State the Weins displacement Law and Stefan-Boltzmann law. How do these laws play an important role in astrophysics. Estimate the surface temperature of a star if the radiation it emits has a maximum intensity at a wavelength of 700 nm. What is the intensity radiated by the star? (b = $2.89 \times 10^{-3} m - k$ and $\sigma = 5.67 \times 10^{-8} W m^{-2} K^{-4}$) (8+4+8)	20	CO1