Name: **Enrolment No:**	

UPES

End Semester Examination May 2025

Course: SOLAR PHYSICS **Semester: 6th**

Program: B.Sc. Physics Hons. **Time : 03 hrs.**

Course Code: PHYS 3025P **Max. Marks: 100**

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

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Explain the space-based observatories to study the properties of the Solar flare dynamics on the Sun?	**4**	**CO2**
Q 2	Explain the dark spot cycle in the Sun.	**4**	**CO1**
Q 3	Describe how solar flares affect Earth's atmosphere.	**4**	**CO2**
Q 4	Discuss the relation between luminosity and the brightness of a star? The photosphere of the Sun emits nearly at the wavelength of 510 nm. Determine the effective temperature of the photo sphere (proportionality constant is 2898 micrometer-K)?	**4**	**CO1**
Q 5	Explain the influence of magnetic fields in solar plasma dynamics and discuss the importance of self-induction?	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Derive the Zeeman splitting formula for the Sun's magnetic field? A solar flare occurs when the magnetic field in the Sun's atmosphere reconnects. If the magnetic fields before reconnection are B1 = 3 Gauss and B2 = 4 Gauss, and the area of reconnection is A = 1 $\times 10^{12}$ m^2, calculate the change in magnetic flux?	**10**	**CO4**
Q 7	Briefly explain the structure of the Sun and in what manner energy transport phenomena take place in the convection zone of the Sun.	**10**	**CO2**
Q 8	What do you understand by the solar cycle? An astronomer records the following sunspot data over a	**10**	**CO4**

	week: | Day | Groups (G) |Spots(S) |---------- |---------- |----------| | Monday | 6 | 45 | Tuesday | 7 | 50 | Wednesday | 5 | 40 | Thursday | 8 | 55 | Friday | 6 | 42 | Calculate the daily Wolf Number assuming k = 1 and find the average Wolf Number over the five days.		
Q 9	Explain the CNO (Carbon – Nitrogen -Oxygen) cycle and derive the necessary equations.	**10**	**CO4**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	How does the study of solar flares take place in X-ray? Explain the thermal and non-thermal emission mechanism of electromagnetic radiation from the Sun? Solar flare occurs when the magnetic field in the Sun's atmosphere reconnects if magnetic fields before reconnection are 3 G and 4G area of reconnection is 10^{12} meter square. Calculate change in magnetic flux. Or Briefly explain the solar flare and CME phenomenon on the SUN. The solar wind expands spherically from the surface of the sun with a velocity of 400 km/sec at distance of 1 solar radius. Assuming density of particle at this distance is 5×10^6 particles per cm cube. Calculate particle density at distance of 2 solar radii.	**20**	**CO4**
Q 11	Briefly explain the structure of the Sun and in what manner energy transport phenomena take place in the convection zone of the Sun.	**20**	**CO2**

	For the Zeeman splitting to be observable, the splitting of the spectral line should be at least $\Delta\lambda = 0.1$ pm. Calculate the minimum magnetic field required for this to happen for a spectral line of wavelength $\lambda = 500$ nm?		