

Registration Number:

Date & session:



ST. JOSEPH'S UNIVERSITY, BENGALURU -27
Physics open elective – II SEMESTER
SEMESTER EXAMINATION: APRIL 2024
(Examination conducted in May/June 2024)
PH OE 2: Wonders of Physics
(for regular students only)

Time: 2 Hours

Max Marks: 60

This paper contains four printed pages and two parts

PART-A

Answer any four questions. Each question carries ten marks.

[4x10 = 40]

1. Write Aristotle's four causes for the objects shown below.

a.



b.



c.



2. Give a schematic diagram explaining the five levels of information.

3. You are on a spaceship traveling at a significant fraction of the speed of light. As you zoom through the cosmos, you encounter a peculiar phenomenon. Your onboard clock seems to tick slower than the clocks on Earth. Additionally, you notice that objects outside the spaceship appear to be squished in the direction of motion. Your fellow crew members are intrigued by these observations and begin discussing the concepts of general and special relativity. Considering the above scenario, Answer the following questions.

a. You observe that the clocks on Earth appear to be ticking faster than the clock onboard your spaceship. How would you explain this phenomenon to your crew members using the principles of special relativity?

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b. As you look out the window of the spaceship, you notice that distant stars and galaxies appear to be flattened in the direction of motion. How can you relate this observation to the concept of length contraction from special relativity?

c. One of your crew members asks why time seems to pass differently for you on the spaceship compared to people on Earth. How would you describe the effect of relative motion on the passage of time, incorporating the principles of general relativity?

4. Explain any 5 attributes of time.

5. Here are 10 riddles that are connected to the documentary "The Privileged Planet". Find them all.

a. I'm a shield from the Sun's burning might,
Without me, life on Earth would face a plight.
UV rays bounce off me with delight,
What am I, protecting day and night?

b. Beneath Earth's surface, I quietly glide,
Creating mountains with my powerful stride.
Nutrients I recycle, ecosystems I guide,
In Earth's geological dance, I take pride.

c. I flow and ripple, a source of delight,
Without me, life would be out of sight.
Chemical reactions, I help ignite,
On Earth's surface, I shimmer and ignite.

d. Just the right size, not too small or too grand,
I provide a home where life can expand.
With gravity's embrace, I firmly stand,
What am I, in the cosmic strand?

e. Invisible but essential, my presence is felt,
Protecting Earth from the solar belt.
Solar winds I repel, keeping harm at bay,
What am I, guarding night and day?

f. I'm a celestial event, a dance of light,
When the Moon covers the Sun, day turns to night.
Shadows dance upon the land, a mystical sight,
What am I, in nature's grand flight?

g. Not too hot, not too cold, just right,
In this zone, life takes flight.
Where planets orbit, bathed in light,
What am I, the Goldilocks' delight?

h. Amidst the stars, a special place I've known,
Where life finds refuge, seeds are sown.
In this cosmic band, Earth has grown,
What am I, the galactic zone?

i. In the grand design, I hold a key,
Where constants align, just so, you see.
A delicate balance, for life to be,
What am I, shaping destiny?

j. Across the cosmos, a harmony divine,
Where stars and galaxies intertwine.
In this cosmic symphony, destinies align,
What am I, where mysteries intertwine?

PART B

Answer any four questions. Each question carries five marks.

[4x5 = 20]

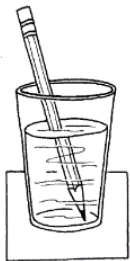
6. Write a note on the trinity of science with the help of the image you see below.



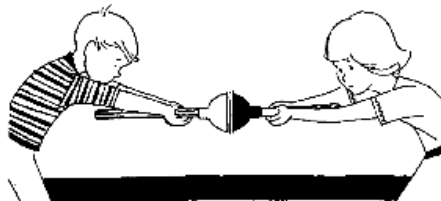
7. Explain the life and death of sun-like stars.

8. Briefly mention the concepts, or words that you are reminded of when you see the cartoons given below.

a.



b.



c.



9. There are words jumbled below. find the correct word and write a sentence on it.

- a. VYAGRTI
- b. TEHA
- c. ORFEC
- d. CPEOELSTE
- e. SULHTET

10. In about 100 words, share your experience on how the course has induced a sense of wonder in you.