

INSTRUCTIONS

- At the entrance of the Planetarium Dome, the following items were handed over to you:
 1. An envelope marked **B**
 2. A head torch and a green pen.
- Please verify the Contestant Code printed on envelope marked **B**. Inside you will find:
 1. This Instruction Sheet in English and/or your native language (if applicable)
 2. One envelope marked **S** (please verify the Contestant Code marked on it).
- You are allowed to open the envelope **S** only when the whistle is blown to mark the start of the examination. The exam time (approx. 50 minutes) starts from this point.
- Inside the envelope **S** you will find:
 1. Question Paper in English and/or your native language (if applicable)
 2. A set of Summary Answer Sheets (please verify the Contestant Code marked on them).
- Note that a tablet-arm chair is attached with each seat in the Planetarium.
- There are three questions in this exam: OP01, OP02, and OP03. You will have 15 minutes to read the question paper, and make any preliminary plans for your observation. During this time, lights in the planetarium dome will be on.
 - Time for Question OP01 (45 marks) is 14 minutes. (Note: This includes dark adaptation and the main task).
 - Time for Question OP02 (15 marks) is 6 minutes.
 - Time for Question OP03 (15 marks) is 8 minutes.
 - A whistle will be blown at the start and at the end of each question.
 - There will be a break of 1 minutes between the questions.
 - At the end of the projection, lights will be turned on again, and you will have 5 minutes to finalize your answers.
 - If you use a pencil to mark or trace something, please overwrite by the green pen before submission to improve clarity.
 - At any time during the examination, you may stand up at your place and/or turn around. However, you are not allowed to move out of your place.
 - You must maintain strict silence throughout the examination.

- The flow of the examination is as follows:

Lights ON	15 min	Question reading and observation planning
Lights OFF	30 min 50 sec	Projection on dome
Time (min:sec)	Duration	Projection
00:00 – 00:10	10 sec	Question OP01 text message on dome
00:10 - 14:10	14 min	Projection for Question OP01
14:10 - 15:10	1 min	Break
15:10 – 15:20	10 sec	Question OP02 text message on dome
15:20 - 17:20	2 min	Projection for Question OP02
<i>Repeat projection for Question OP02 3 times</i>		
21:40 - 22:40	1 min	Break
22:40 – 22:50	10 sec	Question OP03 text message on dome
22:50 - 30:50	8 min	Projection for Question OP03
Lights ON	5 min	Finalization

- **At the end of the examination:**

- Place all Summary Answer Sheets inside the envelope **S** irrespective of whether you have used them or not. These Summary Answer Sheets must be sorted in order of the questions, from OP01, OP02, to OP03.
- **Only the contents of the envelope **S** will be evaluated. Any sheet that is not placed inside this envelope will not be evaluated.**
- Place the envelope **S** inside the envelope **B**.
- Instruction Sheet(s) and Question Paper(s) should be placed directly inside the envelope **B**.
- Tie the thread seal on the envelope **B**.
- Carry the envelope **B**, the head torch, and the green pen to the exit and drop them in the designated boxes.

OP01 (45 points)

This is the simulated sky in February 10, 2025 as seen from Quan Tượng Đài, an ancient observatory located in Huế, Vietnam. The Sun is not shown in the simulation.

a) (5 points) In which constellation is the Sun located? Write its Latin name or IAU abbreviation.

b) (5 points) Which constellation is at the West cardinal point? Write its Latin name or IAU abbreviation.

c) (14 points) Check the boxes next to the constellations hosting the visible planets (points will be deducted for incorrect or excess answers). Underline the name of the checked constellation (in the answer sheet) where Mercury is located.

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|--------------|--------------------------|-----------------|--------------------------|-----------------|--------------------------|---------------|--------------------------|
| Aries/Ari | ☐ | Taurus/Tau | ☐ | Gemini/Gem | ☐ | Cancer/Cnc | ☐ |
| Leo | ☐ | Virgo/Vir | ☐ | Libra/Lib | ☐ | Ophiuchus/Oph | ☐ |
| Scorpius/Sco | ☐ | Sagittarius/Sgr | ☐ | Capricornus/Cap | ☐ | Aquarius/Aqr | ☐ |
| Pisces/Psc | ☐ | Orion/Ori | ☐ | Auriga/Aur | ☐ | Cetus/Cet | ☐ |

d) (16 points) Check the boxes next to 7 stars (in the answer sheet) that are missing from this simulated sky (points deducted for incorrect or excess answers).

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|----------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| Hamal/ α Ari | ☐ | Menkalinan/ β Aur | ☐ | Mirach/ β And | ☐ |
| Alhena/ γ Gem | ☐ | Diphda/ β Cet | ☐ | Schedar/ α Cas | ☐ |
| Menkar/ α Cet | ☐ | Sadalmelik/ α Aqr | ☐ | Alderamin/ α Cep | ☐ |
| Scheat/ β Peg | ☐ | Algol/ β Per | ☐ | Sadr/ γ Cyg | ☐ |
| Ankaa/ α Phe | ☐ | Rigel/ β Ori | ☐ | Fomalhaut/ α PsA | ☐ |

e) (5 points) Estimate the local apparent solar time.

OP02 (15 points)

Comet Hale-Bopp (C/1995 O1) appears in this simulated sky from February 15, 1997 to June 15, 1997.

a) (5 points) Determine the date (DD/MM) on which the comet nucleus is closest to Betelgeuse (α Ori).

b) (5 points) Determine the date (DD/MM) on which the comet nucleus crosses the ecliptic.

c) (5 points) Estimate the elongation ϵ of the comet nucleus from the Sun when it crosses the ecliptic.

OP03 (15 points)

This is the simulated sky above a site (45.4°S , 180°E) on the far side of the Moon, not so far from Von Kármán Crater, where Chang'e-4 became the first spacecraft to soft-land there in 2019. Now the Moon is in its first quarter at zero libration as viewed from Earth.

- a) (5 points) In which constellation is the Sun located? Write its Latin name or IAU abbreviation.
- b) (5 points) In which constellation is the Earth located? Write its Latin name or IAU abbreviation.
- c) (5 points) What is the altitude h of the Earth from this site?