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PG CBCS
M.Sc. Semester-IV Examination, 2022
PHYSICS
PAPER: PHS404D
(*GALACTIC ASTROPHYSICS & EXTRA-GALACTIC ASTROPHYSICS*)

Full Marks: 40   **Time: 2 Hours**

Write the answer for each unit in separate sheet

The figures in the right-hand margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

PHS 404D.1 *Galactic Astrophysics*

Marks: 20
GROUP-A

1. Answer any two question: 2×2=4

a) Discuss the various "phases" of gas in the interstellar medium.
b) What limits the age of an HII region?
c) Assuming a constant interstellar extinction of 1 magnitude per kilo par sec, what is the maximum distance to which we could see a bright globular cluster in our Galaxy using a telescope with a limiting visual magnitude of 23.5?
d) What is the difference between a spectrometer and a camera?
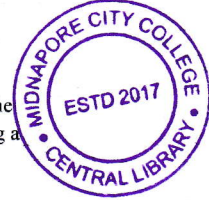
GROUP-B

2. Answer any two questions: 2×4=8

a) Why do the different regions of the Galaxy have different mentality?
b) From Virial theorem, how can you get rough estimate of the mass of the central black hole of Milkyway?
c) How detection limit of a telescope is related with the exposure time and the telescope aperture?
d) What do you mean by angular magnification and light gathering power of a telescope?

GROUP-C

3. Answer any one questions: 1×8=8

a) Describe the rotation curve of Milkyway? How the rotational curve leads to the idea of dark matter?   (5+3)
b) Describe different types of reflecting telescopes. Compare different kind of astronomical detectors.   (4+4)

(Turn Over)

PHS 404D.2 Extra-*Galactic Astrophysics*

Marks: 20

GROUP-A

1. Answer any two question: 2×2=4
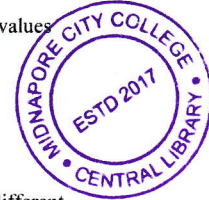a) Find the dimensions of H.
b) Explain why at one time, the steady state theory appeared necessary.
c) What are lenticular galaxies?
d) Why older galaxies should be redder?

GROUP-B

2. Answer any two questions: 2×4=8
a) How many revolutions has the Galaxy made since the formation of the Solar System if we take the solar velocity around the galactic centre to be 365 km s−1 ?
b) Explain how the Tully-Fisher relation $L \propto 4$ can be used to determine the distances of spiral galaxies.
c) Draw a schematic diagram showing the behavior of the scale factor a(t) for various values of k in FRW cosmological model (with zero cosmological constant).
d) What is luminosity distance? How is it related to the proper distance?

GROUP-C

3. Answer any one questions: 1×8=8
a) Derive Friedmann equation and explain from this equation the faith of Universe for different value of k.
b) Explain Hubble's classification of galaxies. What is de Vaucouleurs law?   (5+3)

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