



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 3 Examination in Engineering: July 2017

Module Number: IS3207

Module Name: Introduction to Astronomy

[Three Hours]

[Answer ALL questions, each question carries 10 marks]

- Q1 a) Define the following terms used in Astronomy
- i) Polar Regions
 - ii) Temperate zone
 - iii) Antarctic circle
- [3 marks]
- b) i) What is the shortest distance between Colombo and Bangkok?
Colombo - 6.9101° N, 79.8541° E
Bangkok - 13.7563° N, 100.5018° E
- [4 marks]
- ii) A helicopter is to fly from Colombo to Bangkok. What heading should it follow?
- [3 marks]
- Q2 a) With the help of a sketch explain how distances to nearer stars are measured using trigonometric parallax.
- [6 marks]
- b) For the star Alpha Centauri the parallax is 0.76 seconds. Calculate the distance from earth to Alpha Centauri in
- i) Million kilometers
 - ii) Parsecs
 - iii) Astronomical units
 - iv) Light years
- [4 marks]
- Q3 a) An observer is standing at a location in the Northern Hemisphere of Earth where the Latitude is λ . She is trying to locate a star whose declination is δ . Under what conditions is the star circumpolar?
- [2 marks]
- The first column of the table on the next page gives a list of five stars and their declinations. The first row gives a list of five cities and their latitudes. For each city classify each star as circumpolar, visible or not visible.
- [8 marks]

	Hapugala $\lambda=6.1\text{N}$	London $\lambda=51.5\text{N}$	Hobart $\lambda=42.9\text{S}$	Belem $\lambda=1.5\text{S}$	Mumbai $\lambda=19.1\text{N}$
Sirius $\delta=-16.2$					
Acrux $\delta=-63.4$					
Castor $\delta=+32.0$					
Aldebaran $\delta=+17.2$					
Polaris $\delta=+89.5$					

- Q4 a) Explain the importance of Maha Dasa and Anthar Dasa in predicting a person's future according to Vedic Astrology. [3 marks]
- b) Explain why Vedic Astrology is considered superior to Western Astrology. [3 marks]
- c) You are looking at horoscopes of two people born on 10th June 2017. In the first one prepared according to western astrology, the lagna is Taurus. In the second, prepared according to vedic astrology the lagna is leo. Explain the possible reason for this difference. [4 marks]

- Q5. Write short notes on the following
- Vedic astrology and Western Astrology
 - Solar system
 - Zodiac
 - Extra-terrestrial Life
 - Four dimensional approach in Vedic Astrology

[2 marks each]

Formula Sheet

$$\cos(a) = \cos(b) \times \cos(c) + \sin(b) \times \sin(c) \times \cos(A)$$

$$\cos(b) = \cos(a) \times \cos(c) + \sin(a) \times \sin(c) \times \cos(B)$$

$$\cos(c) = \cos(b) \times \cos(a) + \sin(b) \times \sin(a) \times \cos(C)$$

$$\sin(a) / \sin(A) = \sin(b) / \sin(B) = \sin(c) / \sin(C)$$

$$\sin(\delta) = \sin(\lambda)\cos(z) - \cos(\lambda)\sin(z)\cos(\alpha)$$

$$\cos(\lambda) = -P / Q$$

$$P = \sin(\delta_1)\cos(z_2) - \sin(\delta_2)\cos(z_1)$$

$$Q = \cos(z_1)\sin(z_2)\cos(\alpha_2) - \sin(z_1)\cos(z_2)\cos(\alpha_1)$$

Diameter - Radius of Earth = 12750 km

Declination of Sun on 21st June = 23.5° N

Declination of Sun on 21st December = 23.5° S

14	2	3d 20m	6d 40m			26d 40m	30d 0m	Virgo
	3 Thula	6d 40m	10d 0m			0	3d 20m	Libra
	4 Libra	10d 0m	13d 20m			3d 20m	6d 40m	Scorpio
Swati	1	0	3d 20m	Rahu	18	6d 40m	10d 0m	Sagittarius
15	2	3d 20m	6d 40m			10d 0m	13d 20m	Capricorn
	3	6d 40m	10d 0m			13d 20m	16d 40m	Aquarius
	4	10d 0m	13d 20m			16d 40m	20d 0m	Pisces
Vishaka	1	0	3d 20m	Jupiter	16	20d 0m	23d 20m	Aries
16	2	3d 20m	6d 40m			23d 20m	26d 40m	Taurus
	3	6d 40m	10d 0m			26d 40m	30d 0m	Gemini
	4 Wrushchika	10d 0m	13d 20m			0	3d 20m	Cancer.
Anuradha	1 Scorpio	0	3d 20m	Saturn	19	3d 20m	6d 40m	Leo
17	2	3d 20m	6d 40m			6d 40m	10d 0m	Virgo
	3	6d 40m	10d 0m			10d 0m	13d 20m	Libra
	4	10d 0m	13d 20m			13d 20m	16d 40m	Scorpio
Jyeshtha	1	0	3d 20m	Mercury	17	16d 40m	20d 0m	Sagittarius
18	2	3d 20m	6d 40m			20d 0m	23d 20m	Capricorn
	3	6d 40m	10d 0m			23d 20m	26d 40m	Aquarius
	4	10d 0m	13d 20m			26d 40m	30d 0m	Pisces
Moola	1	0	3d 20m	Kethu	7	0	3d 20m	Aries
19	2	3d 20m	6d 40m			3d 20m	6d 40m	Taurus
	3	6d 40m	10d 0m			6d 40m	10d 0m	Gemini
	4	10d 0m	13d 20m			10d 0m	13d 20m	Cancer.
Purwa	1	0	3d 20m	Venus	20	13d 20m	16d 40m	Leo
Asadha	2	3d 20m	6d 40m			16d 40m	20d 0m	Virgo
20	3	6d 40m	10d 0m			20d 0m	23d 20m	Libra
	4	10d 0m	13d 20m			23d 20m	26d 40m	Scorpio
Uttar	1	0	3d 20m	Sun	6	26d 40m	30d 0m	Sagittarius
Asadha	2 Makara	3d 20m	6d 40m			0	3d 20m	Capricorn
21	3 Capricorn	6d 40m	10d 0m			3d 20m	6d 40m	Aquarius
	4	10d 0m	13d 20m			6d 40m	10d 0m	Pisces
Shrawana	1	0	3d 20m	Moon	10	10d 0m	13d 20m	Aries
22	2	3d 20m	6d 40m			13d 20m	16d 40m	Taurus
	3	6d 40m	10d 0m			16d 40m	20d 0m	Gemini
	4	10d 0m	13d 20m			20d 0m	23d 20m	Cancer.
Dhanista	1	0	3d 20m	Mars	7	23d 20m	26d 40m	Leo
23	2	3d 20m	6d 40m			26d 40m	30d 0m	Virgo
	3 Kumbha	6d 40m	10d 0m			0	3d 20m	Libra
	4 Aquarius	10d 0m	13d 20m			3d 20m	6d 40m	Scorpio
Satabhisha	1	0	3d 20m	Rahu	18	6d 40m	10d 0m	Sagittarius
24	2	3d 20m	6d 40m			10d 0m	13d 20m	Capricorn
	3	6d 40m	10d 0m			13d 20m	16d 40m	Aquarius
	4	10d 0m	13d 20m			16d 40m	20d 0m	Pisces
Purva	1	0	3d 20m	Jupiter	16	20d 0m	23d 20m	Aries
Bhadrapad	2	3d 20m	6d 40m			23d 20m	26d 40m	Taurus
25	3	6d 40m	10d 0m			26d 40m	30d 0m	Gemini
	4 Meena	10d 0m	13d 20m			0	3d 20m	Cancer.
Uttar	1 Pisces	0	3d 20m	Saturn	19	3d 20m	6d 40m	Leo
Asadha	2	3d 20m	6d 40m			6d 40m	10d 0m	Virgo
26	3	6d 40m	10d 0m			10d 0m	13d 20m	Libra
	4	10d 0m	13d 20m			13d 20m	16d 40m	Scorpio
Revati	1	0	3d 20m	Mercury	17	16d 40m	20d 0m	Sagittarius
27	2	3d 20m	6d 40m			20d 0m	23d 20m	Capricorn
	3	6d 40m	10d 0m			23d 20m	26d 40m	Aquarius
	4	10d 0m	13d 20m			26d 40m	30d 0m	Pisces

Nekath	Pada	Lagna	Maha Dasa				Navamsa		
			from	to	Lord	Years	from	to	
Aswini	1	1 Mesha	0	3d 20m	Kethu	7	0	3d 20m	Aries
		2 Aries	3d 20m	6d 40m			3d 20m	6d 40m	Taurus
		3	6d 40m	10d 0m			6d 40m	10d 0m	Gemini
		4	10d 0m	13d 20m			10d 0m	13d 20m	Cancer.
Bharani	2	1	0	3d 20m	Venus	20	13d 20m	16d 40m	Leo
		2	3d 20m	6d 40m			16d 40m	20d 0m	Virgo
		3	6d 40m	10d 0m			20d 0m	23d 20m	Libra
		4	10d 0m	13d 20m			23d 20m	26d 40m	Scorpio
Krittika	3	1	0	3d 20m	Sun	6	26d 40m	30d 0m	Sagittarius
		2 Wrushabha	3d 20m	6d 40m			0	3d 20m	Capricorn
		3 Taurus	6d 40m	10d 0m			3d 20m	6d 40m	Aquarius
		4	10d 0m	13d 20m			6d 40m	10d 0m	Pisces
Rohini	4	1	0	3d 20m	Moon	10	10d 0m	13d 20m	Aries
		2	3d 20m	6d 40m			13d 20m	16d 40m	Taurus
		3	6d 40m	10d 0m			16d 40m	20d 0m	Gemini
		4	10d 0m	13d 20m			20d 0m	23d 20m	Cancer.
Mrigshira	5	1	0	3d 20m	Mars	7	23d 20m	26d 40m	Leo
		2	3d 20m	6d 40m			26d 40m	30d 0m	Virgo
		3 Mituna	6d 40m	10d 0m			0	3d 20m	Libra
		4 Gemini	10d 0m	13d 20m			3d 20m	6d 40m	Scorpio
Aridra	6	1	0	3d 20m	Rahu	18	6d 40m	10d 0m	Sagittarius
		2	3d 20m	6d 40m			10d 0m	13d 20m	Capricorn
		3	6d 40m	10d 0m			13d 20m	16d 40m	Aquarius
		4	10d 0m	13d 20m			16d 40m	20d 0m	Pisces
Punarvasu	7	1	0	3d 20m	Jupiter	16	20d 0m	23d 20m	Aries
		2	3d 20m	6d 40m			23d 20m	26d 40m	Taurus
		3	6d 40m	10d 0m			26d 40m	30d 0m	Gemini
		4 Kartaka	10d 0m	13d 20m			0	3d 20m	Cancer.
Pushya	8	1 Cancer.	0	3d 20m	Saturn	19	3d 20m	6d 40m	Leo
		2	3d 20m	6d 40m			6d 40m	10d 0m	Virgo
		3	6d 40m	10d 0m			10d 0m	13d 20m	Libra
		4	10d 0m	13d 20m			13d 20m	16d 40m	Scorpio
Ashlesha	9	1	0	3d 20m	Mercury	17	16d 40m	20d 0m	Sagittarius
		2	3d 20m	6d 40m			20d 0m	23d 20m	Capricorn
		3	6d 40m	10d 0m			23d 20m	26d 40m	Aquarius
		4	10d 0m	13d 20m			26d 40m	30d 0m	Pisces
Magha	10	1 Simha	0	3d 20m	Kethu	7	0	3d 20m	Aries
		2 Leo	3d 20m	6d 40m			3d 20m	6d 40m	Taurus
		3	6d 40m	10d 0m			6d 40m	10d 0m	Gemini
		4	10d 0m	13d 20m			10d 0m	13d 20m	Cancer.
Purva Phalguni	11	1	0	3d 20m	Venus	20	13d 20m	16d 40m	Leo
		2	3d 20m	6d 40m			16d 40m	20d 0m	Virgo
		3	6d 40m	10d 0m			20d 0m	23d 20m	Libra
		4	10d 0m	13d 20m			23d 20m	26d 40m	Scorpio
Uttra Phalguni	12	1	0	3d 20m	Sun	6	26d 40m	30d 0m	Sagittarius
		2 Kanni	3d 20m	6d 40m			0	3d 20m	Capricorn
		3 Virgo	6d 40m	10d 0m			3d 20m	6d 40m	Aquarius
		4	10d 0m	13d 20m			6d 40m	10d 0m	Pisces
Hasta	13	1	0	3d 20m	Moon	10	10d 0m	13d 20m	Aries
		2	3d 20m	6d 40m			13d 20m	16d 40m	Taurus
		3	6d 40m	10d 0m			16d 40m	20d 0m	Gemini
		4	10d 0m	13d 20m			20d 0m	23d 20m	Cancer.
Chitra	1		0	3d 20m	Mars	7	23d 20m	26d 40m	Leo