



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 3 Examination in Engineering: August 2015

Module Number: IS3207

Module Name: Introduction to Astronomy

[Three Hours]

[Answer ALL questions, each question carries 12 marks]

Q1 a) The boundary file for the constellation Circinus is given below. Plot the boundary of this constellation on a graph sheet.

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13 38 43.2687|-64.6379395|CIR
13 38 49.7951|-65.6378784|CIR
13 49 04.3255|-65.6249542|CIR
13 49 50.6089|-70.6244431|CIR
14 56 39.9459|-70.5115433|CIR
14 56 00.8721|-68.0122070|CIR
15 06 13.7103|-67.9909286|CIR
15 05 24.8485|-64.0751266|CIR
15 20 39.9789|-64.0415649|CIR
15 20 13.0967|-61.4587479|CIR
15 30 21.5435|-61.4353065|CIR
15 30 11.9682|-60.4354935|CIR
15 29 31.6587|-55.4362831|CIR
15 12 20.0427|-55.4754944|CIR
14 40 56.2717|-55.5400887|CIR
14 42 03.5939|-64.5390244|CIR
```

[4.0 Marks]

b) Is the whole constellation Circinus visible from Los Angeles (Lat 34.5 deg. N)?
Answers without supporting calculations will carry no marks.

[8.0 Marks]

Q2 Discuss the following:

a) Are we alone in the Universe?

[3.0 Marks]

b) Match making according to Vedic Astrology

[3.0 Marks]

c) Vedic Astrology - 'A science of potentials and probabilities.'

[3.0 Marks]

d) The difference between the Sun sign Taurus and zodiac sign Taurus.

[3.0 Marks]

Q3 Mr. SWRD Bandaranayake, one of the former Prime Ministers of Sri Lanka was born on 08th January 1899, at 09:12 am. In Colombo. Fig. Q3 shows Mr. Bandaranayake's horoscope cast in Vedic style.

SWRD Bandaranayake Jan 8, 1899
 Time: 9:12AM Zone: 5:30 DST: 0
 Colombo
 Longitude: 79E54 Latitude: 6N52 CurPer: Ra/Ma/Ju
 Lahiri Ayanamsa: 22:27 365.25 Day Year

			Ke 16:10
As 6:52			MaR 10:30
Me 2:05 Ra 16:10 Su 25:13	Mo 2:47 Ve 14:37 Sa 26:01	Ju 14:31	

As 06:52	Aq	Vimshottari Dashas
Su 25:13	Sg	Ju Jan-08-1899
Mo 02:47	Sc	Sa Sep-06-1899
MaR 10:30	Cn	Me Sep-07-1918
Me 02:05	Sg	Ke Sep-07-1935
Ju 14:31	Li	Ve Sep-07-1942
Ve 14:37	Sc	Su Sep-07-1962
Sa 26:01	Sc	Mo Sep-06-1968
Ra 16:10	Sg	Ma Sep-07-1978
Ke 16:10	Ge	Ra Sep-07-1985

	Me		
Ju Sa Ke			Mo
			Ra
As	Su Ve	MaR	

Figure Q3: Horoscope of Mr SWRD Bandaranayake

- a) Convert the horoscope into Sri Lankan style [4.0 Marks]
- b) In what maha dasa and anthar dasa was Mr Bandaranayake when
- He graduated in May 1923 from Oxford University?
 - He married in May 1940 ?
 - He was elected as Prime Minister in April 1956 ?
 - He was killed in September 1959 ?

[8.0 Marks]

- Q4 a) Define the following terms used in measuring distances
- Astronomical Unit
 - Parsec
 - Light Year

[6.0 Marks]

- b) The following table gives the distance in light years, of five stars as observed from earth. Calculate the distances to these stars from earth in,
- Astronomical Units
 - Parsecs
 - Kilometers

Assume that the distance between the Sun and Earth is 149 million kilometers

Star	Procyon	Proxima	Bernard	Ross	Luyten
Light years	11.6	4.2	6.0	9.4	11.2

[6.0 Marks]

- Q5 a) Define the following terms used in astronomy.

- Polar regions
- Temperate zones
- Antarctic circle

[6.0 Marks]

- b) i) What is the shortest distance between Galle and Jaffna

Galle - 6.0350° N, 80.2158° E

Jaffna - 9.6603° N, 80.0079° E

- ii) A helicopter is to fly from Galle to Jaffna, in a straight line. What heading should the pilot follow?

[6.0 Marks]

Formulas

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

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

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

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

$$\text{Radius of Earth} = 6371 \text{ km}$$

$$\tan p = \frac{A}{d}$$

$$d = \frac{206,265}{p}$$

$$d = \frac{3.26}{p}$$

All notations have the usual meanings.

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

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	Dhanu	0	3d 20m	Kethu	7	0	3d 20m	Aries
19	2	Sagittarius	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