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Reg. No. : .....

**Code No. : 30370 E    Sub. Code : JMMA 6 B**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2020.

Sixth Semester

Mathematics – Main

Major Elective – III : ASTRONOMY – II

(For those who joined in July 2016 only)

Time : Three hours

Maximum : 75 marks

PART A — ( $10 \times 1 = 10$  marks)

Answer ALL questions.

Choose the correct answer :

1. In May 15, The value of  $E$  \_\_\_\_\_  
(a)  $-14^m 21^s$                       (b)  $+3^m 45^s$   
(c)  $-6^m 22^s$                       (d)  $+16^m 22^s$
2. In  $E = E_1 + E_2$  where  $E_1$  is called the equation of time due to \_\_\_\_\_  
(a) Eccentricity                      (b) Obliquity  
(c) Acutity                              (d) None

3. Lunar month is about \_\_\_\_\_ days
- (a)  $28\frac{1}{2}$  (b)  $29\frac{1}{2}$
- (c)  $30\frac{1}{2}$  (d)  $31\frac{1}{2}$
4. If elongation is  $90^\circ$ , then the moon is said to be \_\_\_\_\_
- (a) Conjunction (b) Opposition
- (c) Quadratures (d) None
5. The minor lunar ecliptic limit is \_\_\_\_\_
- (a)  $18^\circ 31'$  (b)  $15^\circ 24'$
- (c)  $12^\circ 5'$  (d)  $9^\circ 30'$
6. The minimum number of eclipses in a year is
- (a) 2 (b) 7
- (c) 3 (d) 5
7. The inner planets are \_\_\_\_\_
- (a) Mars, Jupiter (b) Mercury, Venus
- (c) Saturn, Uranus (d) Neptune, Pluto

8. The maximum elongation is  $\theta =$ —————

(a)  $\sin^{-1}\left(\frac{b}{a}\right)$                       (b)  $\cos^{-1}\left(\frac{b}{a}\right)$

(c)  $\tan^{-1}\left(\frac{b}{a}\right)$                       (d)  $\cot^{-1}\left(\frac{b}{a}\right)$

9. ————— is the simplest form of sundial

(a) Horizontal                      (b) Equatorial

(c) Zenith Sector                      (d) None

10. ————— is a simple instrument used by Greeks and ancient Hindus.

(a) Telescope                      (b) Microscope

(c) Sundial                      (d) Moondial

PART B — ( $5 \times 5 = 25$  marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Express in sidereal time an interval of  $16^h 18^m 24^s$  of mean time.

Or

- (b) If  $\odot$  is the sun's longitude, prove that  
$$\cot E_2 = \cot 2 \odot + \operatorname{cosec} 2 \odot \cot^3 \frac{w}{2}.$$

12. (a) Lunar liberations – Explain.

Or

- (b) Find the horizontal parallax of moon by meridian observation.

13. (a) Prove that the maximum number of eclipses in a year is 7.

Or

- (b) Find the condition for the totality of lunar eclipse.

14. (a) Explain Bode's Law.

Or

- (b) Find the relation between the sidereal and synodic periods of a planet.

15. (a) What is a spectroscope. Explain it uses.

Or

- (b) Derive the latitude of a place.

PART C — ( $5 \times 8 = 40$  marks)

Answer ALL questions, choosing either (a) or (b)

16. (a) If  $t_1, t_2$  are the hourly variations in the equations of time when the sun is at perigee and apogee show that  $e = \frac{t_1 - t_2}{t_1 + t_2} \tan^2 \frac{w}{2}$ , assuming that the equinoctial line to be perpendicular to the apse line of earth's orbit.

Or

- (b) Prove that  $E = -2e \sin(l - k) + \tan^2 \frac{w}{2} \sin 2l$  with usual notation.

17. (a) Discuss the different phases of moon.

Or

- (b) Prove that the phase of the moon  $= \frac{1 - \cos \theta}{2}$ .

18. (a) Prove that the length of the earth's shadow is 215 time the radius of the earth.

Or

- (b) Derive the condition for the occurrences of lunar and solar eclipses.

19. (a) Find the different phases of a planet in one synodic revolution.

Or

- (b) Prove that the phase of a planet  $= \frac{1 + \cos \theta}{2}$ .

20. (a) Explain constellations.

Or

- (b) Write short notes on

- (i) Helio meter
  - (ii) Chronograph
  - (iii) Radio telescope.
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