



c.  $319^{\circ}13.6'$

d. N  $89^{\circ}17.9'$

7. PZ of the celestial spherical triangle PZX corresponds to \_\_\_\_\_.

- a. Declination of body
- b. Latitude of Observer
- c. Co-Latitude of Observer
- d. Zenith Distance of body

8. Which method is used to obtain the Position line when the celestial body is just out of meridian?

- a. Meridian Altitude
- b. Ex Meridian Altitude
- c. Intercept
- d. Longitude by Chronometer

9. What is the correct sequence of twilights in the morning leading to Sunrise?

- a. Astronomical, Nautical, Civil, Sunrise
- b. Civil, Nautical, Astronomical, Sunrise
- c. Sunrise, Astronomical, Nautical, Civil
- d. Sunrise, Civil, Nautical, Astronomical

10. How many Meridian passage will a Circumpolar body have?

- a. 1
- b. 2
- c. 3
- d. 4

### Section B

#### **Five Questions of 02 Marks each**

11. Show with diagram altitude of the Sun at the time of theoretical Sunrise?

12. Calculate the Sunrise time in GMT for an observer in DR  $18^{\circ}$ N,  $143^{\circ}$ E on 27<sup>th</sup> Apr 2008.

13. Define Sidereal Day and state its exact duration.

14. A ship sails from Mumbai, India (TZ UTC + 5:30 Hrs) on 28<sup>th</sup> Mar / 2200 Hrs LT. Find ETA (in LT) Cape Town, South Africa (TZ UTC + 2:00 Hrs) if sailing time is 12D 08H.

15. When calculating Polaris sight, why is  $1^{\circ}$  subtracted from calculation in the end?

**Section C**

**Answer all questions. Five Questions of 10 Marks each.**

16. (a) Why is Actual Sun not an efficient time keeper? How is this compensated? {6 Marks}
- (b) On 17<sup>th</sup> Jan 2008 / 12H 44M 19S GMT at DR  $34^{\circ} 56' N$ ,  $093^{\circ} 30' E$ , VENUS was observed at  $140^{\circ} (C)$ . If Var is  $4^{\circ} W$ , find the Dev of Compass. {4 Marks}
17. On 21<sup>st</sup> Jul 2008 / 23H 10M 30S GMT, at DR  $46^{\circ} 20' N$ ,  $027^{\circ} 30' W$ , Sext Alt of POLARIS was  $46^{\circ} 44.2'$ . If Height of Eye is 31 mtr, Index error was  $0.2'$  ON the arc, find the direction of LOP and the position from where to draw it. {10 Marks}
18. On 25<sup>th</sup> Feb 2008 / 10H 06M 20S GMT, at DR  $13^{\circ} 40' N$ ,  $086^{\circ} 14' E$ , Sext Alt of Sun's UL was  $31^{\circ} 21.3'$ . If Height of Eye is 25 mtr, Index error is  $2.6'$  OFF the arc, find the direction of LOP and INTERCEPT from DR. {10 Marks}
19. On 14<sup>th</sup> Sep 2008 / 06H 20M 15S GMT at DR  $11^{\circ} 12' N$ ,  $065^{\circ} 03' E$ , Sext Alt of Sun's LL was  $66^{\circ} 42.0'$ . If Height of Eye is 36 mtr, Index Error is  $2.5'$  OFF the arc, find the direction of LOP and the LONG where it cuts the DR Lat. {10 Marks}
20. (a) Define Circumpolar Body. What is the condition for the celestial body to be Circumpolar for an observer in a given location? {04 Marks}
- (b) Meridian Passage readings of a Circumpolar body was observed as follows:  
Lower Meridian Passage : True Altitude  $15^{\circ} 30'$  Brg South  
Upper Meridian Passage : True Altitude  $76^{\circ} 30'$  Brg North
- Find the Latitude of the observer and the Declination of celestial body. {06 Marks}

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