STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2015–16 & thereafter)

SUBJECT CODE: 15MT/ME/ES55

B. Sc. DEGREE EXAMINATION, APRIL 2019
BRANCH I – MATHEMATICS
SIXTH SEMESTER

COURSE : MAJOR ELECTIVE
PAPER : ELEMENTS OF SPACE SCIENCE
TIME : 3 HOURS **MAX. MARKS: 100**

SECTION-A

ANSWER ALL QUESTIONS: **$10 \times 2 = 20$**

1. Define great circle and small circle.
2. State Napier's formula.
3. Find the hour angle of the body at rising or setting.
4. Find the longitude of the sun on any day.
5. Define civil twilight.
6. What is the effect of horizontal refraction on dip?
7. Give the rule to convert sidereal time into mean solar time.
8. How to calculate Indian Standard Time?
9. State the Kepler's laws.
10. What is meant by eclipseseasons ?

SECTION-B

ANSWER ANY FIVE QUESTIONS: **$5 \times 8 = 40$**

11. Define spherical triangle and mention its properties.
12. Compare geocentric parallax and refraction.
13. Explain the different types of Aberration.
14. Find the sidereal time at Greenwich corresponding to mean time 8h.12m.45s on a given date, given that the mean time of sidereal noon was 6h.47m.40s.
15. Find the longitude of the sun on any day.
16. Find the eccentricity of the Earth's orbit around the sun.
17. Find the maximum number of eclipses that can occur in a year.

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SECTION-C

ANSWER ANY TWO QUESTIONS: 2 ×20 = 40

18. (a) Draw a diagram of the celestial sphere as seen at Trivandrum (latitude $8^o30'$N) on the 10^{th} April at 8 p.m showing therein the positions of the sun, the moon (aged 7 days) and a star of R.A. $6^h\ 40^m$ and declination $30^\circ S$.

    (b) Derive the cosine formula in the spherical triangle ABC. (12 + 8)

19. (a) Find the duration of twilight.

    (b) Find the mean time corresponding to 12h.6m.37s sidereal time on May 4, 1940, given that mean time at sidereal noon was 9h.11m.35s. (12 + 8)

20. (a) Explain the direct and retrograde motions of planets.

    (b) Find the condition for the occurrence of a total solar eclipse. (12 + 8)