VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.E. I Year (ECE) I-Semester (Make Up) Examinations, March-2016
(Communication Engineering & Signal Processing)
Global Navigational Satellite Systems

Time: 3 hours   Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE questions from Part-B

Part-A (10 X 2=20 Marks)

1. Discuss in brief the principle of Hyperbolic navigation.
2. Determine the orbital period of a GPS satellite, if the semi major axis, $a = 2.6369 \times 10^7$ m, and Earth's Gravitational Constant, $GM = 3.98 \times 10^{14}$ m^3/sec^2.
3. Compute the chip length of C/A code and P code.
4. What is the difference between an ellipsoid and geoid?
5. If TEC is 2.86×10^{18} el/m^2, calculate the ionospheric time delay on L_1 frequency.
6. What is multipath? How does it affect the GPS range measurements?
7. Mention various errors affecting the accuracy of DGPS system.
8. What are the salient features of GPS carrier phase measurements?
9. Explain why augmentation is necessary for GPS.
10. Mention the names of any three augmentation systems being implemented around the world.

Part-B (5 X 10=50 Marks)

11. a) Describe the classical orbital parameters (Keplerian elements) with the help of a neat diagram giving relevant equations with respect to GPS.   [6]
    b) Explain the principle of operation of GPS with the help of a neat diagram.   [4]

12. a) With the help of a neat block diagram, list out the important components of a GPS receiver and explain their functions.   [6]
    b) If the ECEF coordinates of a point are X = 4,91,185.35 m, Y= 5,614,274.28 m, Z= 2,976,505.27 m, determine the WGS-84 latitude and longitude.   [4]

13. a) Given the measured rms errors of i) pseudorange, $\sigma = 1.2$ m, ii) user position in x, y and z directions, $\sigma_x = 1.5$ m, $\sigma_y = 1.4$ m, $\sigma_z = 1.8$ m respectively, and iii) user clock error expressed in distance, $\sigma_b = 0.8$ m, calculate GDOP, PDOP, VDOP, HDOP and TDOP.   [5]
    b) Describe how the ionosphere and troposphere affects the GPS signal as it travels from the satellite to receiver.   [5]

14. a) Explain the architecture and principle of operation of DGPS with the help of a neat diagram.   [6]
    b) What is RINEX? Discuss in brief about RINEX observation and Navigation formats.   [4]

15. a) Discuss about WAAS with the help of neat diagram.   [6]
    b) Compare the salient features of GPS, GLONASS and Galileo satellite constellations.   [4]

16. a) With the help of a neat diagram explain the principle of operation of Transit navigation system.   [5]
    b) Explain the significance of WGS-84 reference system.   [5]

17. Write short notes on any **two** of the following:
    a) GPS-GIS integration   [5]
    b) Significance of DOP in position estimation   [5]
    c) Future GPS signals   [5]

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