DO ALL 25 PROBLEMS.
MARK YOUR ANSWERS ON THE SCANTRON AND TURN IT IN. YOU MAY KEEP THE ORIGINAL EXAM.

\[ c = 3 \times 10^{10} \quad G = 6.7 \times 10^{-8} \quad h = 6.6 \times 10^{-27} \quad \sigma = 5.7 \times 10^{-5} \]
\[ 1 \text{pc} = 3 \times 10^{18} \text{cm} \quad 1 \text{AU} = 1.5 \times 10^{13} \text{cm} \quad M_\odot = 2 \times 10^{33} \text{g} \quad R_\odot = 7 \times 10^{10} \text{cm} \]
\[ \lambda v = c \quad E = h \nu \quad L = \sigma A T^4 \quad F = ma \quad \lambda T = x \quad \frac{v}{c} = \frac{\delta \lambda}{\lambda_0} \quad R = \frac{2GM}{c^2} \]

MULTIPLE CHOICE (4 points each)

_____ 1. The solar wind emerges from:
   a) solar core  b) sunspots  c) coronal arcs  d) coronal holes

_____ 2. Which planet’s spin axis is tilted over 98 degrees?
   a) Venus  b) Mars  c) Uranus  d) Neptune  e) Pluto

_____ 3. A torus of hot gas surrounds which planet?
   a) Venus  b) Jupiter  c) Pluto  d) Earth  e) Saturn

_____ 4. The sun’s energy comes from:
   a) fusion of hydrogen into helium
   b) fusion of helium into hydrogen
   c) fission of hydrogen into helium
   d) fission of helium into hydrogen

_____ 5. You are standing beside a methane ocean. There is little to see because there is smog in all directions. Where are you?
   a) Venus  b) Earth  c) Mars  d) Titan  e) Ganymede

_____ 6. Cassini is a NASA mission to which planet?
   a) Venus  b) Mars  c) Jupiter  d) Saturn  e) Pluto

_____ 8. How many moons does Venus have?
   a) 0  b) 1  c) 2  d) 3  e) 12
9. Which planet is brilliant blue, has white clouds, and a Great Dark Spot?
   a) Earth  b) Jupiter  c) Saturn  d) Neptune  e) Pluto

10. Which of these planets has no known ring system?
    a) Jupiter  b) Saturn  c) Uranus  d) Neptune  e) Pluto

11. What is the most common element in the atmosphere of a gas giant?
    a) hydrogen  b) helium  c) nitrogen  d) oxygen  e) methane

12. What gas gives the bluish appearance to some of the gas giants?
    a) hydrogen  b) helium  c) nitrogen  d) oxygen  e) methane

13. The cloud from which the solar system formed was composed principally of:
    a) iron and nickel
    b) aluminum and oxygen
    c) hydrogen and helium
    d) carbon dioxide

14. The Sun reaches a peak of activity every:
    a) year  b) 25 days  c) 100,000 years  d) 11 years

15. The temperature of the solar corona is:
    a) 270 K  b) 5500 K  c) ten thousand K  d) two million K

16. The temperature at the core of the Sun is:
    a) 5500 K  b) 250,000 K  c) 15,000,000 K  d) 237,000,000 K

17. The temperature of the solar photosphere is:
    a) 270 K  b) 5500 K  c) 10,000 K  d) 2,000,000 K

18. The sunspot cycle can affect:
    a) the Earth's weather  b) the solar corona  c) the solar wind  d) all of the above
    e) none of the above

19. What percentage of the mass of the Solar System resides in the Sun?
    a) 50%  b) 90%  c) 95%  d) 99%  e) 99.9%

20. The surface of Venus is so hot primarily because:
    a) Venus is so close to the Sun
    b) the infrared radiation cannot escape
    c) Venus does not rotate
    d) Venus is heated by volcanoes
    e) the sunlight cannot reach the surface
21. The primary constituent of Titan's atmosphere is:
   a) oxygen  b) carbon dioxide  c) nitrogen  d) methane

22. Which body is the most volcanically active body in the solar system?
   a) Mercury  b) Venus  c) Earth  d) Saturn  e) Io

23. Cassini’s Division is:
   a) a giant canyon on Venus  b) a gap in the rings of Saturn  c) a resonance of the Jovian moons
   d) the place occupied by the asteroids  e) a broken moon of Neptune

24. The white clouds on Neptune are made of:
   a) methane ice  b) water ice  c) steam  d) ammonia  e) ethylene

25. The great red spot of Jupiter is caused by:
   a) a concentration of iron  
   b) a cometary impact  
   c) a persistent storm  
   d) a hidden continent  
   e) swamp gas

Answers: 1d, 2c, 3b, 4a, 5d, 6d, 8a, 9d, 10e, 11a, 12e, 13c, 14d, 15d, 16c, 17b, 18d, 19e, 20b, 21c, 22e, 23b, 24a, 25c