

國立中央大學八十六學年度碩士班研究生入學試題卷

所別: 天文研究所 不分組 科目: 天文學 共 2 頁 第 1 頁

Section I. Multiple Choice Questions

(2 points each, 50 points in total. Multiple answers possible)

- The ecliptic is the
 - projection of the earth's equator onto the celestial sphere
 - earth's orbital plane projected onto the celestial sphere
 - apparent path of the moon on the celestial sphere
 - apparent path of the sun on the celestial sphere
- If Sirius, the brightest star in the sky, rises at 10:00pm tonight, tomorrow night it will rise at
 - 9:30pm
 - 9:56pm
 - 10:00pm
 - 10:04pm
 - 10:30pm
- In order for a solar eclipse to occur, the moon must be
 - near new moon
 - near first or last quarter
 - near full moon
 - high in the sky
- Kepler's second law means that
 - a planet moves more rapidly when near the sun than when farther away
 - planets close to the sun have shorter periods than those farther away
 - the sun is at the center of planetary orbits
 - slowly moving planets are close to the sun
- If the size of the earth were to double (with the mass unchanged), a person's weight would
 - double
 - half
 - increase by 4 times
 - decrease by 4 times
 - unchanged
- As a ball of gas collapses its rotational speed increases. This is caused by
 - Newton's 3rd law
 - conservation of angular momentum
 - Kepler's third law
 - universal law of gravity
- Consider two stars having the same temperature, but one has a surface area four times that of the other. The more luminous body radiates how much more than the other one.
 - 2
 - 4
 - 8
 - 16
 - 256
- Suppose we have two identical galaxies -- one at a distance of two million light years and the other at a distance of four million light years. The nearby one is brighter than the far one by
 - 0.75 mag
 - 1 mag
 - 1.5 mag
 - 2 mag
- The resolution of a telescope depends on the
 - objective focal length
 - objective diameter
 - magnification
 - all of above
- If telescope A has a light gathering power 4 times that of telescope B, how much farther into space can telescope A penetrate?
 - 2
 - 4
 - 8
 - 16
 - cannot be determined from the information given
- The difference between ^3He and ^4He is
 - a neutron
 - a proton
 - an electron
 - a neutrino
- The absorption line spectrum of the sun comes from
 - interior
 - photosphere
 - chromosphere
 - corona
- If a star has a parallax of 0.25 second of arc, what is its distance in parsecs?
 - 0.25
 - 0.625
 - 4
 - 16
 - none of above
- If a stellar spectrum has neutral helium lines, but no ionized helium lines, its spectral type would be
 - O
 - B
 - A
 - F
 - G
 - K
- Which of the following is not useful for determining stellar temperatures?
 - spectral class
 - color index
 - absolute magnitude
 - degree of ionization
 - wavelength of maximum emission
- Binary stars are particularly important for determining stellar
 - luminosity
 - temperature
 - distance
 - mass
 - radius
- If the interior temperature of a star decrease, the star will
 - cool off to become planet
 - contract to smaller size
 - outer part expands to become planetary nebula
 - become cold red giant
- The way in which a star evolves depends primarily on the star's
 - radius
 - mass
 - luminosity
 - density
 - temperature
- Stars within a star cluster differ in their
 - distance
 - age
 - chemical composition
 - mass
- As a degenerate gas is heated, it will
 - expand
 - contract
 - oscillate
 - neither expand nor contract
- At the end of its life, the Sun will become
 - white dwarf
 - blue supergiant
 - neutron star
 - black hole
- Interstellar dust grains are the size of
 - basketballs (30cm)
 - golf balls (2cm)
 - salt grains (1mm)
 - atoms (1 angstrom)
 - none of the above
- The stars observed in globular clusters all have masses somewhat less than that of the sun because
 - only low mass stars were formed in globular clusters
 - high mass stars were ejected from clusters by tidal effects
 - high mass stars all died out
 - high mass stars are all too faint to observe
- If a galaxy has a mass-to-light ratio of 50, the galaxy is composed of primarily
 - O stars
 - A stars
 - F stars
 - K stars
 - dark matter
- The cosmological critical density is
 - the density of matter in our Galaxy
 - the density at which an object becomes a black hole
 - the density at the time of big bang
 - the density of flat universe

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Section II. True/False Questions

(1 point each, 50 points in total)

Answer in "True" or "False"

1. Kepler's 3rd law is a relation between the period of revolution of a planet around the sun and the planet's mass
2. Radiation of longer wavelength has a higher frequency
3. Diffraction is the bending of light, such as when light passes from air to glass
4. A body at 5000K radiates 5 times the energy radiated by a body at 1000K
5. A star at a distance of 1000 light years will appear to be 100 times fainter than a star at 100 light years
6. A star which is stationary with respect to the Sun will have no Doppler shift when observed with spectroscopes
7. The color of a star depends primarily on the star's temperature measured at its surface
8. The sun has a temperature of almost 6000K and radiate most of energy at nearly 5000Å. A star of 12000K radiates most of its energy at 2500Å
9. If a spectral line normally at 5000Å is observed at 5001Å, the radial velocity is 60km/sec
10. The 200 inch telescope can observe objects 10 times fainter than a 20 inch telescope
11. The 200 inch telescope can see 10 times farther into space than a 20 inch telescope (for objects of the same brightness)
12. The light gathering power of a 10 inch reflector is greater than a 10 inch refractor
13. Coude focus is used primarily to observe faint objects
14. The fact that we on earth see only one side of the moon indicates that the moon does not rotate
15. The orbits of planets are more elliptical for outer planets and more circular for inner planets
16. The core of the sun is completely ionized
17. Due to its large mass, the Sun has an average density as high as iron
18. The edge of the sun appears darker than the center. This is because we see more into hotter layers in the center
19. No star have parallax bigger than 1 arcsecond
20. The bolometric magnitude of a star is fainter than the visual magnitude
21. Under normal conditions, stars will show absorption lines but no emission lines
22. H-R diagram shows that stars of a given spectral type can have any value of luminosity
23. Red supergiants are considerably cooler than red giants
24. Dwarf stars are below the main sequence in H-R diagram
25. If the temperature and radius of a star are known, the absolute magnitude is uniquely determined
26. To determine a star's mass, we must know its distance
27. Supergiant stars have masses similar to blue main sequence stars
28. In main sequence, stellar winds occur mostly among early type stars
29. Along the main sequence, stars have similar size
30. OB associations are known to be older than common open clusters in galactic disk
31. For main sequence fitting technique, we assume that all clusters have identical main sequence
32. Main sequence turn-off point is very useful in determining the distance to a star cluster
33. With central nuclear reaction, the hot gas can rise outward from the central part of a star. This process, called 'convection', is effective in most stars like the Sun but not in much more massive stars where gravity is very big
34. A neutron star more massive than 1.4 solar masses cannot exist
35. Elements heavier than iron are formed during the last stage of stellar evolution called white dwarf
36. Spectral lines of white dwarf are redshifted because of their high gravity
37. A pulsar is a rapidly pulsating neutron star
38. 21cm radiation is produced while hydrogen ionization occurs
39. RR Lyrae stars are much fainter than Cepheids and have shorter periods
40. The density of stars in the galactic disk is nearly the same in the spiral arms as between them
41. Interstellar dust cannot absorb 21cm hydrogen radiation
42. Chemical composition of interstellar medium is the same as the chemical composition of the Sun
43. Diffuse clouds are composed primarily of hydrogen
44. Dust located behind a nearby star will form a reflection nebula
45. Globular clusters are Population II objects
46. Local Group is a group of nearby stars and includes Sun
47. If Sun revolves around the Galaxy at 250 km/sec, it will take 2.5 billion years to make one revolution
48. Just like stars, galaxy mass can be derived from binary galaxies
49. The expansion of the universe was discovered by observing the microwave background radiation
50. If a galaxy appears 5 magnitude brighter than another identical galaxy, the expansion velocity of the brighter one will be 10 times smaller than the fainter one.