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National Testing Agency

Question Paper Name :	Stars And Stellar Systems 15th S
Subject Name :	Stars and Stellar Systems
Creation Date :	2020-09-15 13:26:32
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Display Marks:	Yes
Share Answer Key With Delivery Engine :	Yes
Actual Answer Key :	Yes

Stars And Stellar Systems

Group Number :	1
Group Id :	89951420
Group Maximum Duration :	0
Group Minimum Duration :	120
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	100
Is this Group for Examiner? :	No

Stars And Stellar Systems

Section Id :	89951420
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	4

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Number of Questions to be attempted :	4
Section Marks :	100
Display Number Panel :	Yes
Group All Questions :	Yes
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	89951430
Question Shuffling Allowed :	Yes

Question Id : 8995141596 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Gro
: No

Question Numbers : (1 to 25)

Question Label : Comprehension

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CONSTANTS AND CONVERSION FACTORS:

Speed of light $c = 3 \times 10^{8} ms^{-1}$

Planck's constant $h = 6.626 \times 10^{-34} J.s$

Gravitational constant $G = 6.674 \times 10^{-11} m^{3} kg^{-1} s^{-2}$

Mass of proton $m_p = 1.673 \times 10^{-27} kg$

Mass of electron $m_e = 9.109 \times 10^{-31} kg$

Stefan-Boltzmann constant $\sigma = 5.670 \times 10^{-8} Jm^{-2} s^{-1} K^{-4}$

Boltzmann constant $k = 1.381 \times 10^{-23} JK^{-1}$

Mass of Sun $M_{\odot} = 1.989 \times 10^{30} kg$

Luminosity of Sun $L_{\odot} = 3.83 \times 10^{26}$ W

Radius of Sun $R_{\odot} = 6.96 \times 10^{8}$ m

Mass of Earth $M_{\oplus} = 5.972 \times 10^{24} kg$

$$1eV = 1.602 \times 10^{-19} J$$

$$1pc = 3.26ly;\ 1pc = 3.086 \times 10^{16} m;\ 1ly = 9.461 \times 10^{15} m$$

$$1yr = 3.154 \times 10^{7} s$$

Sub questions

Question Number : 1 Question Id : 8995141597 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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What are the progenitors of type-Ia supernovae?

A. 10-15 $M_\odot$

B. 20-30 $M_\odot$

C. 2-3 $M_\odot$

D. 100 $M_\odot$

Options :
8995146360. 1
8995146361. 2
8995146362. 3
8995146363. 4

Question Number : 2 Question Id : 8995141598 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Primary elements produced during AGB evolution are

A. C, N, O and s-process

B. Fe-peak and Mg, Si

C. Mg, Si and r-process

D. Ca, Ti, Eu

Options :
8995146364. 1
8995146365. 2
8995146366. 3
8995146367. 4

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Question Number : 3 Question Id : 8995141599 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is Lithium plateau?

A. The constant Lithium abundances derived from cosmic baryon density based on CMB measurement

B. Lithium observed in the interstellar medium

C. Lithium observed in metal poor halo dwarfs

D. Lithium that is made in cosmic ray spallation

Options :
8995146368. 1
8995146369. 2
8995146370. 3
8995146371. 4

Question Number : 4 Question Id : 8995141600 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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Typical mass of the Giant Molecular Cloud is

A. about 10 $M_\odot$

B. about 100 $M_\odot$

C. few 100 $M_\odot$

D. greater than 1000 $M_\odot$

Options :
8995146372. 1
8995146373. 2
8995146374. 3
8995146375. 4

Question Number : 5 Question Id : 8995141601 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Our Sun has already spent about _____ of its nuclear burning lifetime.

A. 90%

B. 80%

C. 50%

D. 30%

Options :
8995146376. 1
8995146377. 2
8995146378. 3
8995146379. 4

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Question Number : 6 Question Id : 8995141602 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

For an observer in Australia

A. north celestial pole is visible in the sky

B. south celestial pole is visible in the sky

C. none of the celestial poles are visible in the sky

D. both the celestial poles are visible on opposite sides of the sky

Options :
8995146380. 1
8995146381. 2
8995146382. 3
8995146383. 4

Question Number : 7 Question Id : 8995141603 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The maximum mass possible for a white dwarf star is

A. 1.4 $M_\odot$

B. 1.0 $M_\odot$

C. 0.1 $M_\odot$

D. 0.8 $M_\odot$

Options :
8995146384. 1

8995146385. 2
8995146386. 3
8995146387. 4

Question Number : 8 Question Id : 8995141604 Question Type : MCQ Option Shuffling : No Display Quest Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The stars Betelguese and Rigel are in the constellation of Orion. Betelguese appears red while Rigel appears bluish. This is because

A. Rigel is farther than Betelguese from us
B. Rigel is nearer than Betelguese from us
C. surface of Rigel is hotter than Betelguese
D. surface of Rigel is cooler than Betelguese

Options :
8995146388. 1
8995146389. 2
8995146390. 3
8995146391. 4

Question Number : 9 Question Id : 8995141605 Question Type : MCQ Option Shuffling : No Display Quest Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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Limb darkening in the image of a stellar disc is due to

A. poor image quality at edges

B. energy production throughout the star

C. line-of sight at edge intersects lower temperature regions unlike the centre

D. star-spots, similar to sunspots

Options :
8995146392. 1
8995146393. 2
8995146394. 3
8995146395. 4

Question Number : 10 Question Id : 8995141606 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The intermediate element produced in triple alpha reaction is

A. Li

B. Be

C. B

D. C

Options :
8995146396. 1
8995146397. 2

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8995146398. 3
8995146399. 4

Question Number : 11 Question Id : 8995141607 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following statements is not true about most brown dwarfs?

A. Effective temperatures lie between 900 and 3500 K

B. Very faint low luminosity objects

C. They have strong winds

D. Some nuclear fusion occurs in their interiors

Options :
8995146400. 1
8995146401. 2
8995146402. 3
8995146403. 4

Question Number : 12 Question Id : 8995141608 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

gamma Doradus variable stars fall on the

A. main-sequence

B. horizontal branch

C. red-giant branch

D. asymptotic giant branch

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Options :

8995146404. 1

8995146405. 2

8995146406. 3

8995146407. 4

Question Number : 13 Question Id : 8995141609 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

beta Cephei and SPB stars are located in the

A. Cepheid instability strip

B. Delta Scuti instability strip

C. red-giant branch

D. main-sequence

Options :

8995146408. 1

8995146409. 2

8995146410. 3

8995146411. 4

Question Number : 14 Question Id : 8995141610 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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Which variable stars help in constraining lower bound on the age of the Universe?

A. Type I Cepheids

B. Type II Cepheids

C. RR Lyrae variables

D. Mira variables

Options :
8995146412. 1
8995146413. 2
8995146414. 3
8995146415. 4

Question Number : 15 Question Id : 8995141611 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The distance of the first Lagrange point from Earth is

A. one hundredth of 1 AU

B. one tenth of 1 AU

C. one thousandth of 1 AU

D. same as 1 AU

Options :
8995146416. 1
8995146417. 2
8995146418. 3

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8995146419. 4

Question Number : 16 Question Id : 8995141612 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The optical emission from the Sun comes from the photosphere, while that seen at low radio frequencies arises in the

A. photosphere

B. chromosphere

C. transition layer

D. corona

Options :
8995146420. 1
8995146421. 2
8995146422. 3
8995146423. 4

Question Number : 17 Question Id : 8995141613 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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Is the current global warming completely due to the Sun's activity?

A. No

B. Maybe

C. Yes

D. We do not have the understanding to answer this question

Options :
8995146424. 1
8995146425. 2
8995146426. 3
8995146427. 4

Question Number : 18 Question Id : 8995141614 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the source of energy for powering solar storms and stellar flares?

A. Gravitational energy

B. Nuclear energy

C. Potential energy

D. Magnetic energy

Options :
8995146428. 1
8995146429. 2
8995146430. 3
8995146431. 4

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Question Number : 19 Question Id : 8995141615 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The Alfven flux freezing condition

A. applies to high Reynolds number plasma

B. applies to situations where the conductivity of the plasma is very small

C. applies to situations where Alfven waves propagate

D. applies to situations where the resistivity is high

Options :
8995146432. 1
8995146433. 2
8995146434. 3
8995146435. 4

Question Number : 20 Question Id : 8995141616 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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In a neutron star, what is the density above which superfluid neutrons are expected to be found?

A. 4×10^{11} g cm^{-3}

B. 4×10^{12} g cm^{-3}

C. 4×10^{13} g cm^{-3}

D. 4×10^{14} g cm^{-3}

Options :
8995146436. 1
8995146437. 2
8995146438. 3
8995146439. 4

Question Number : 21 Question Id : 8995141617 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The value of a neutron star's magnetic field obtained from the accretion rate ($B \propto \dot{M}$) gives an estimate of the

A. large scale dipolar field

B. dipolar field at Alfven radius

C. total field strength at light cylinder

D. higher multipoles at the surface

Options :
8995146440. 1

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8995146441. 2
8995146442. 3
8995146443. 4

Question Number : 22 Question Id : 8995141618 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A 1.4 $M_{\odot}$ neutron star is supported against gravity by

A. degeneracy pressure of neutrons alone

B. degeneracy pressure of neutrons combined with repulsive nuclear interaction

C. repulsive nuclear interactions alone

D. degeneracy pressure of electrons

Options :
8995146444. 1
8995146445. 2
8995146446. 3
8995146447. 4

Question Number : 23 Question Id : 8995141619 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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The number of neutron stars in our Galaxy is estimated to be of order

A. 10^5

B. 10^7

C. 10^9

D. 10^{11}

Options :
8995146448. 1
8995146449. 2
8995146450. 3
8995146451. 4

Question Number : 24 Question Id : 8995141620 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

For accreting hydrogen-rich matter, the energy generated by nuclear burning E_{nuc} on the surface of a compact star compares with its gravitational binding energy E_g as

A. $E_g > E_{nuc}$ for both neutron star and white dwarf

B. $E_g < E_{nuc}$ for both neutron star and white dwarf

C. $E_g > E_{nuc}$ for white dwarf and $E_g < E_{nuc}$ for neutron star

D. $E_g < E_{nuc}$ for white dwarf and $E_g > E_{nuc}$ for neutron star

Options :
8995146452. 1

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8995146453. 2
8995146454. 3
8995146455. 4

Question Number : 25 Question Id : 8995141621 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is stellar inclination?

A. The angle between the star, the Earth and the Sun

B. The angle between the axis of rotation of the star and an observer's line of sight on Earth

C. The ratio of the equatorial to polar rotation rates of the star

D. The change in the angle of the axes of surface and core rotation

Options :
8995146456. 1
8995146457. 2
8995146458. 3
8995146459. 4

Sub-Section Number : 2
Sub-Section Id : 89951431
Question Shuffling Allowed : Yes

Question Id : 8995141622 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Gro
: No
Question Numbers : (26 to 50)
Question Label : Comprehension

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CONSTANTS AND CONVERSION FACTORS:

Speed of light $c = 3 \times 10^8 ms^{-1}$

Planck's constant $h = 6.626 \times 10^{-34} J.s$

Gravitational constant $G = 6.674 \times 10^{-11} m^3 kg^{-1} s^{-2}$

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Mass of Sun $M_\odot = 1.989 \times 10^{30} kg$

Luminosity of Sun $L_\odot = 3.83 \times 10^{26}$ W

Radius of Sun $R_\odot = 6.96 \times 10^8$ m

Mass of Earth $M_\oplus = 5.972 \times 10^{24} kg$

$$1eV = 1.602 \times 10^{-19} J$$

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$$1yr = 3.154 \times 10^7 s$$

Sub questions

Question Number : 26 Question Id : 8995141623 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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RR Lyrae variable stars obey an absolute magnitude-metallicity relation of the form $M_V = 0.23[Fe/H] + 0.984$. If [Fe/H]= -1.5 dex and apparent magnitude $m_v = 19.8$ mag, then the distance to an RR Lyrae is

A. 67.95 kpc

B. 61.23 kpc

C. 78.34 kpc

D. 10.29 kpc

Options :
8995146460. 1
8995146461. 2
8995146462. 3
8995146463. 4

Question Number : 27 Question Id : 8995141624 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following stars has the longest pre-main sequence phase?

A. 5.5 $M_\odot$

B. 10 $M_\odot$

C. 3 $M_\odot$

D. 1 $M_\odot$

Options :
8995146464. 1

8995146465. 2
8995146466. 3
8995146467. 4

Question Number : 28 Question Id : 8995141625 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A radio interferometer must necessarily

A. observe over a broad spectral band

B. offer observations with a high time resolution

C. comprise of a number of individual telescopes or elements

D. be built at very high altitudes

Options :
8995146468. 1
8995146469. 2
8995146470. 3
8995146471. 4

Question Number : 29 Question Id : 8995141626 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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Suppose degeneracy lifting due to rotation (normally expected) is not observed in the oscillation spectrum of a main sequence star. This could be because

A. the star is non-rotating

B. magnetism in the star has the opposite impact on degeneracy as rotation, and the net observed degeneracy is therefore zero in the observations

C. the signal-to-noise ratio of the spectrum is too low to observe this

D. degeneracy lifting due to rotation occurs only in young stars

Options :
8995146472. 1
8995146473. 2
8995146474. 3
8995146475. 4

Question Number : 30 Question Id : 8995141627 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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What is the current local ISM Lithium abundance?

A. Same as what is made during Big Bang as predicted by CMB - A(Li) = 2.7

B. Same as the Lithium abundance that are seen in halo stars A(Li) = 2.1

C. Same as the Lithium abundance observed in Sun A(Li) = 1.5

D. A(Li) > 3

Options :
8995146476. 1
8995146477. 2
8995146478. 3
8995146479. 4

Question Number : 31 Question Id : 8995141628 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Median metallicity of halo stars is given by

A. [Fe/H] ~ 0.0

B. [Fe/H] ~ +1.2

C. [Fe/H] ~ -1.2

D. [Fe/H] ~ -4.0

Options :
8995146480. 1
8995146481. 2

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8995146482. 3
8995146483. 4

Question Number : 32 Question Id : 8995141629 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The Eddington Luminosity L_{Edd} and the Eddington accretion rate $\dot{M}_{Edd}$ for a 1 $M_\odot$ White Dwarf (WD) and for a 1.4 $M_\odot$ Neutron Star (NS) compare as follows:

A. $L_{Edd}(WD) < L_{Edd}(NS)$ and $\dot{M}_{Edd}(WD) > \dot{M}_{Edd}(NS)$

B. $L_{Edd}(WD) < L_{Edd}(NS)$ and $\dot{M}_{Edd}(WD) < \dot{M}_{Edd}(NS)$

C. $L_{Edd}(WD) > L_{Edd}(NS)$ and $\dot{M}_{Edd}(WD) > \dot{M}_{Edd}(NS)$

D. $L_{Edd}(WD) > L_{Edd}(NS)$ and $\dot{M}_{Edd}(WD) < \dot{M}_{Edd}(NS)$

Options :
8995146484. 1
8995146485. 2
8995146486. 3
8995146487. 4

Question Number : 33 Question Id : 8995141630 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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If the spin-period of a radio pulsar is 1s, what is the radius of its light cylinder?

A. $\sim 5 \times 10^8$ cm

B. $\sim 3 \times 10^9$ cm

C. $\sim 5 \times 10^9$ cm

D. $\sim 3 \times 10^8$ cm

Options :
8995146488. 1
8995146489. 2
8995146490. 3
8995146491. 4

Question Number : 34 Question Id : 8995141631 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Why are there no stellar configurations supported purely by neutron degeneracy pressure?

A. M_{max} for neutron degeneracy is smaller than M_{Ch}

B. Neutrons never go into a degenerate state

C. Protons are always present

D. Neutrons become superfluid before becoming degenerate

Options :
8995146492. 1

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8995146493. 2
8995146494. 3
8995146495. 4

Question Number : 35 Question Id : 8995141632 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The bolometric flux measured from a star is 3.4×10^{-12} W/m^2. If the distance to the star is 450 pc, then the luminosity of the star is

A. 21.5 $L_\odot$

B. 37.8 $L_\odot$

C. 96.3 $L_\odot$

D. 54.2 $L_\odot$

Options :
8995146496. 1
8995146497. 2
8995146498. 3
8995146499. 4

Question Number : 36 Question Id : 8995141633 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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If we take a large number of random nearby stars at a given instance and plot them on the HR diagram, we observe that most lie in the main-sequence band. From this, we can infer that

A. the giant stars are faint and hence cannot be detected

B. since Sun is a main-sequence star, all stars have same temperature and size as Sun

C. main-sequence stars having high effective temperature have lower luminosities and vice-versa

D. stars spend most of their lifetime in the main-sequence phase

Options :
8995146500. 1
8995146501. 2
8995146502. 3
8995146503. 4

Question Number : 37 Question Id : 8995141634 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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When light is incident on a purely absorbing medium, the incident intensity

A. increases linearly across the medium

B. decreases linearly across the medium

C. increases exponentially across the medium

D. decreases exponentially across the medium

Options :
8995146504. 1
8995146505. 2
8995146506. 3
8995146507. 4

Question Number : 38 Question Id : 8995141635 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Two stars A and B in a binary system are found to have masses of 2 $M_\odot$ and 1 $M_\odot$ respectively. Their radii are $R_A \sim 1.7\ R_\odot$ and $R_B \sim 0.008\ R_\odot$.

A. A is a red-giant star

B. A is a white dwarf star

C. B is a red-giant star

D. B is a white dwarf star

Options :
8995146508. 1
8995146509. 2
8995146510. 3

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8995146511. 4

Question Number : 39 Question Id : 8995141636 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The typical neutron star magnetic field in an HMXB is

A. 10^6 G

B. 10^8 G

C. 10^{12} G

D. 10^{10} G

Options :
8995146512. 1
8995146513. 2
8995146514. 3
8995146515. 4

Question Number : 40 Question Id : 8995141637 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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Why do magnetic flux tubes rise up through solar (stellar) convection zones to produce sunspots (starspots) on the surface?

A. Because there is no plasma within flux tubes

B. Because the plasma inside flux tubes is hotter

C. Because excess magnetic pressure implies lower internal gas pressure

D. Because there is Hydrogen gas inside flux tube

Options :
8995146516. 1
8995146517. 2
8995146518. 3
8995146519. 4

Question Number : 41 Question Id : 8995141638 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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If the ratio of the masses of the two components of a binary star is 1:3, the orbital period of the binary star is 1 year and semi-major axis of the relative orbit is 2 AU, the masses of the individual components of the binary star in terms of solar masses are, respectively,

A. 1, 3

B. 3, 9

C. 2, 6

D. 2.4, 7.2

Options :
8995146520. 1
8995146521. 2
8995146522. 3
8995146523. 4

Question Number : 42 Question Id : 8995141639 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

How does the change in frequency splitting with spherical harmonic degree reveal latitudinal variations in rotation rate?

A. Modes of various harmonic degrees sample latitudes differently and can therefore sense variations

B. Different harmonic degrees can only sample different radial layers so this measurement cannot reveal latitudinal variations

C. Different harmonic degrees are excited at different latitudes and propagate only on those latitudes

D. It is not possible to measure latitudinal variations in rotation rate using modes

Options :
8995146524. 1
8995146525. 2
8995146526. 3
8995146527. 4

Question Number : 43 Question Id : 8995141640 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

The orbital period of a binary is 1 year and the line of sight speed of the secondary is 70 km/s. What is the nature of the primary?

A. Black hole

B. Neutron star

C. Quark star

D. White dwarf

Options :
8995146528. 1
8995146529. 2
8995146530. 3
8995146531. 4

Question Number : 44 Question Id : 8995141641 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

An observer is located at New Delhi at the following coordinates: 28.6139° N, 77.2090° E. Which one of the following objects will be visible to the observer in the Delhi night sky at some time in the year?

A. Large Magellanic Cloud: RA = $05^{hr}\ 23^{m}\ 34.6^{s}$, Dec = $-69^{o}\ 45'\ 22''$

B. Bellatrix: RA = $05^{hr}\ 25^{m}\ 07.86^{s}$, Dec = $+06^{o}\ 20'\ 58.9''$

C. Globular Cluster NGC 2808: RA = $09^{hr}\ 12^{m}\ 03.10^{s}$, Dec = $-64^{o}\ 51'\ 48.6''$

D. Sigma Octantis: RA = $20^{hr}\ 15^{m}\ 03.21^{s}$, Dec = $-89^{o}\ 08'\ 18.4''$

Options :
8995146532. 1
8995146533. 2
8995146534. 3
8995146535. 4

Question Number : 45 Question Id : 8995141642 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

Two stars A and B have the following spectral characteristics. A displays a peak in near-infrared, has broad absorption bands and hydrogen atomic lines are not visible. Its luminosity is higher than B. B on the other hand, displays Balmer jump, atomic hydrogen lines and is a main-sequence star. Then what can be conclude about spectral types of A and B?

A. A and B are of spectral types AV and MIII, respectively

B. A and B are of spectral types AIII and MV, respectively

C. A and B are of spectral types MIII and AV, respectively

D. A and B are of spectral types MV and AIII, respectively

Options :
8995146536. 1
8995146537. 2
8995146538. 3
8995146539. 4

Question Number : 46 Question Id : 8995141643 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

Solve the equation of hydrostatic equilibrium for a sphere of uniform density when the pressure is zero at the surface. Using this, we find that the pressure at centre of Sirius B whose mass is 1 $M_\odot$ and radius is 0.008 $R_\odot$ is

A. 8.2×10^{23} N/m^2

B. 5.6×10^{21} N/m^2

C. 1.2×10^{25} N/m^2

D. 3.3×10^{22} N/m^2

Options :
8995146540. 1
8995146541. 2
8995146542. 3
8995146543. 4

Question Number : 47 Question Id : 8995141644 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

The spectral type DB corresponds to

A. giant stars with having Hydrogen lines

B. white dwarfs with Helium lines and no Hydrogen lines

C. sub-dwarfs with neutral metal absorption lines

D. variable stars lying along horizontal branch having both Hydrogen and Helium lines

Options :
8995146544. 1
8995146545. 2
8995146546. 3
8995146547. 4

Question Number : 48 Question Id : 8995141645 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

Which of the following statements is NOT true for solar radio emissions?

A. They can carry information about the large scale coronal electron density and temperature distribution

B. They can carry information about the distribution of mildly relativistic electrons trapped in CME plasma

C. They can potentially be used for measuring the detailed three dimensional magnetic field structure of a CME

D. They can be useful sources of information about the propagation effects through the inhomogeneous and turbulent plasma

Options :
8995146548. 1
8995146549. 2
8995146550. 3
8995146551. 4

Question Number : 49 Question Id : 8995141646 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

If for a star (B-V) = 0.4 mag and $(B-V)_0$ = 0.35 mag, given that R_V=3.2. Then the interstellar extinction A_V is given by

A. 0.12 mag

B. 0.16 mag

C. 0.80 mag

D. 0.20 mag

Options :
8995146552. 1
8995146553. 2
8995146554. 3
8995146555. 4

Question Number : 50 Question Id : 8995141647 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Low mass stars are maximum when slope of the Initial Mass Function is

A. -4.5

B. -3.5

C. -2.5

D. -0.5

Options :
8995146556. 1
8995146557. 2

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8995146558. 3
8995146559. 4

Sub-Section Number : 3
Sub-Section Id : 89951432
Question Shuffling Allowed : Yes

Question Id : 8995141648 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Gro : No

Question Numbers : (51 to 75)

Question Label : Comprehension

CONSTANTS AND CONVERSION FACTORS:

Speed of light $c = 3 \times 10^8 ms^{-1}$

Planck's constant $h = 6.626 \times 10^{-34} J.s$

Gravitational constant $G = 6.674 \times 10^{-11} m^3 kg^{-1} s^{-2}$

Mass of proton $m_p = 1.673 \times 10^{-27} kg$

Mass of electron $m_e = 9.109 \times 10^{-31} kg$

Stefan-Boltzmann constant $\sigma = 5.670 \times 10^{-8} Jm^{-2} s^{-1} K^{-4}$

Boltzmann constant $k = 1.381 \times 10^{-23} JK^{-1}$

Mass of Sun $M_\odot = 1.989 \times 10^{30} kg$

Luminosity of Sun $L_\odot = 3.83 \times 10^{26}$ W

Radius of Sun $R_\odot = 6.96 \times 10^8$ m

Mass of Earth $M_\oplus = 5.972 \times 10^{24} kg$

$$1eV = 1.602 \times 10^{-19} J$$

$1pc = 3.26ly;\ 1pc = 3.086 \times 10^{16} m;\ 1ly = 9.461 \times 10^{15} m$

$$1yr = 3.154 \times 10^7 s$$

Sub questions

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Question Number : 51 Question Id : 8995141649 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A magnetic flux tube in the Sun's atmosphere is completely destroyed by a violent magnetic reconnection process. If the flux tube had a field strength of 1000 Gauss, radius of 10,000 km and a length of 20,000 km what is the amount of energy released in the process?

A. 2.5×10^{32} J

B. 5.0×10^{10} J

C. 2.0×10^{32} J

D. 2.5×10^{25} J

Options :
8995146560. 1
8995146561. 2
8995146562. 3
8995146563. 4

Question Number : 52 Question Id : 8995141650 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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What are Pop-III stars?

A. Stars with [Fe/H] ~ 0.0

B. Stars with [Fe/H] ~ -1.0

C. Stars with Z = 0.00

D. Stars with Z= 0.02

Options :
8995146564. 1
8995146565. 2
8995146566. 3
8995146567. 4

Question Number : 53 Question Id : 8995141651 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Estimate the maximum strength of the magnetic field that can be supported by a neutron star ($M = 1.4\ M_{\odot}$, $R = 10$ km) in its centre.

A. $\sim 10^{14}$ G

B. $\sim 10^{16}$ G

C. $\sim 10^{18}$ G

D. $\sim 10^{20}$ G

Options :
8995146568. 1
8995146569. 2
8995146570. 3

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8995146571. 4

Question Number : 54 Question Id : 8995141652 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which one of the following has dimension of mass?

A. $\hbar cG$

B. $\hbar G/c$

C. $(\hbar c/G)^{1/2}$

D. $(\hbar G/c)^{3/2}$

Options :
8995146572. 1
8995146573. 2
8995146574. 3
8995146575. 4

Question Number : 55 Question Id : 8995141653 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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In the absence of General Relativity, the limiting mass of a pure neutron configuration held by degeneracy pressure would be nearly

A. 0.72 $M_\odot$

B. 1.44 $M_\odot$

C. 2.88 $M_\odot$

D. 5.76 $M_\odot$

Options :
8995146576. 1
8995146577. 2
8995146578. 3
8995146579. 4

Question Number : 56 Question Id : 8995141654 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following phenomena is not a likely cause of pulsar glitches?

A. Nulling

B. Superfluid vortex unpinning

C. Thermal pulse due to star quake

D. Crust cracking due to magnetic stress

Options :
8995146580. 1
8995146581. 2

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8995146582. 3
8995146583. 4

Question Number : 57 Question Id : 8995141655 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What fraction of Solar-type stars have been observed to have planets?

A. At least 30%

B. 10 - 20%

C. 5 - 10%

D. less than 5%

Options :
8995146584. 1
8995146585. 2
8995146586. 3
8995146587. 4

Question Number : 58 Question Id : 8995141656 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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What is the dominant source of energy that is expended in a radio pulsars?

A. internal heat of formation

B. rotational energy

C. magnetic energy

D. gravitational potential

Options :
8995146588. 1
8995146589. 2
8995146590. 3
8995146591. 4

Question Number : 59 Question Id : 8995141657 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The Sun's magnetic activity follows a

A. 7 - year cycle

B. 11 - year cycle

C. 4 - year cycle

D. 6 - year cycle

Options :
8995146592. 1
8995146593. 2
8995146594. 3

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8995146595. 4

Question Number : 60 Question Id : 8995141658 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the observed range of M/R for a neutron star?

A. 0.1 - 0.5 $M_\odot$/km

B. 0.5 - 1 $M_\odot$/km

C. 0.05 - 0.3 $M_\odot$/km

D. 1 - 2 $M_\odot$/km

Options :
8995146596. 1
8995146597. 2
8995146598. 3
8995146599. 4

Question Number : 61 Question Id : 8995141659 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the minimum period a pulsar can sustain without disintegration?

A. 0.5 ms

B. 1.5 ms

C. 0.5 s

D. 1 ms

Options :

8995146600. 1

8995146601. 2

8995146602. 3

8995146603. 4

Question Number : 62 Question Id : 8995141660 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following results do not follow from helioseismology?

A. Measurement of the Sun's core temperature

B. Mechanism of coronal heating

C. Constraining the neutrino flux

D. Depth of the convection zone

Options :

8995146604. 1

8995146605. 2

8995146606. 3

8995146607. 4

Question Number : 63 Question Id : 8995141661 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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How does the size of these compact stars compare (R_{NS}, R_{WD}, and R_{BH} are the radii of a neutron star, a white dwarf, and a 1 solar mass black hole respectively)?

A. $R_{NS} > R_{WD} > R_{BH}$

B. $R_{WD} > R_{NS} > R_{BH}$

C. $R_{BH} > R_{NS} > R_{WD}$

D. $R_{BH} = R_{NS} < R_{WD}$

Options :
8995146608. 1
8995146609. 2
8995146610. 3
8995146611. 4

Question Number : 64 Question Id : 8995141662 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

The pulsar timing arrays are sensitive to what frequency of gravitational waves?

A. Mega-Hertz

B. Few Hertz

C. milli-Hertz

D. nano-Hertz

Options :
8995146612. 1
8995146613. 2
8995146614. 3
8995146615. 4

Question Number : 65 Question Id : 8995141663 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What can be inferred from the sound speed in a region of the Sun's interior?

A. small- and large-scale flows

B. magnetic fields

C. temperature fluctuations

D. nuclear burning rates

Options :
8995146616. 1
8995146617. 2

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8995146618. 3
8995146619. 4

Question Number : 66 Question Id : 8995141664 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Most of the pulsars are detected in which electromagnetic band?

A. Gamma-rays

B. X-rays

C. Optical

D. Radio

Options :
8995146620. 1
8995146621. 2
8995146622. 3
8995146623. 4

Question Number : 67 Question Id : 8995141665 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

At the end of its life, the Sun will leave behind which kind of remnant?

A. White dwarf

B. Black hole

C. Neutron star

D. Brown Dwarf

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Options :

8995146624. 1

8995146625. 2

8995146626. 3

8995146627. 4

Question Number : 68 Question Id : 8995141666 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

How is the estimated magnetic field of a pulsar related to its period?

A. $B \propto P$

B. $B \propto P^{1/2}$

C. $B \propto P^{2}$

D. $B \propto 1/P$

Options :

8995146628. 1

8995146629. 2

8995146630. 3

8995146631. 4

Question Number : 69 Question Id : 8995141667 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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The large and small spacing of the stellar oscillation modes are used to infer, respectively, the star's

A. average density and age

B. average density and core temperature

C. core temperature and composition

D. age and composition

Options :
8995146632. 1
8995146633. 2
8995146634. 3
8995146635. 4

Question Number : 70 Question Id : 8995141668 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which emission mechanism can explain the radio emission from a pulsar?

A. Blackbody radiation

B. Incoherent synchrotron radiation

C. Coherent curvature radiation

D. Inverse-Compton radiation

Options :
8995146636. 1
8995146637. 2

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8995146638. 3
8995146639. 4

Question Number : 71 Question Id : 8995141669 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A white dwarf (WD) with a mass less than 0.5 solar masses will likely be a

A. Oxygen-Neon-Magnesium WD

B. Carbon WD

C. Helium WD

D. Carbon-Oxygen WD

Options :
8995146640. 1
8995146641. 2
8995146642. 3
8995146643. 4

Question Number : 72 Question Id : 8995141670 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

The brightness temperature estimate of a typical pulsar's radio emission is of the order

A. 10^3 K

B. 10^{12} K

C. 10^{24} K

D. 10^{33} K

Options :
8995146644. 1
8995146645. 2
8995146646. 3
8995146647. 4

Question Number : 73 Question Id : 8995141671 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Red giants exhibit oscillation frequencies of the order of

A. milli-Hertz

B. nano-Hertz

C. kilo-Hertz

D. micro-Hertz

Options :
8995146648. 1
8995146649. 2
8995146650. 3

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8995146651. 4

Question Number : 74 Question Id : 8995141672 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Roemer delay is the pulse time of arrival delay caused by the effect of

A. the Sun's spacetime curvature correction

B. the Earth's gravitational field

C. light travel time from the telescope to the solar system barycentre

D. dispersion measure

Options :
8995146652. 1
8995146653. 2
8995146654. 3
8995146655. 4

Question Number : 75 Question Id : 8995141673 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

The core overcomes degeneracy pressure and nuclear burning continues all the way to Fe (Iron) beyond stellar mass of about

A. 5 solar mass

B. 10 solar mass

C. 15 solar mass

D. 20 solar mass

Options :
8995146656. 1
8995146657. 2
8995146658. 3
8995146659. 4

Sub-Section Number : 4
Sub-Section Id : 89951433
Question Shuffling Allowed : Yes

Question Id : 8995141674 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Gro
: No
Question Numbers : (76 to 100)
Question Label : Comprehension

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CONSTANTS AND CONVERSION FACTORS:

Speed of light $c = 3 \times 10^8 ms^{-1}$

Planck's constant $h = 6.626 \times 10^{-34} J.s$

Gravitational constant $G = 6.674 \times 10^{-11} m^3 kg^{-1} s^{-2}$

Mass of proton $m_p = 1.673 \times 10^{-27} kg$

Mass of electron $m_e = 9.109 \times 10^{-31} kg$

Stefan-Boltzmann constant $\sigma = 5.670 \times 10^{-8} Jm^{-2} s^{-1} K^{-4}$

Boltzmann constant $k = 1.381 \times 10^{-23} JK^{-1}$

Mass of Sun $M_\odot = 1.989 \times 10^{30} kg$

Luminosity of Sun $L_\odot = 3.83 \times 10^{26}$ W

Radius of Sun $R_\odot = 6.96 \times 10^8$ m

Mass of Earth $M_\oplus = 5.972 \times 10^{24} kg$

$$1eV = 1.602 \times 10^{-19} J$$

$$1pc = 3.26ly;\ 1pc = 3.086 \times 10^{16} m;\ 1ly = 9.461 \times 10^{15} m$$

$$1yr = 3.154 \times 10^7 s$$

Sub questions

Question Number : 76 Question Id : 8995141675 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

A star like our Sun goes through several evolutionary phases during its life cycle. Select which is the correct sequence.

A. Giant molecular cloud → T Tauri star → protostar → main sequence → red giant branch → horizontal branch → asymptotic giant branch → helium flash → planetary nebula→ white dwarf

B. Giant molecular cloud → protostar → main sequence → red giant branch → helium flash → horizontal branch → T Tauri star → asymptotic giant branch → planetary nebula→ white dwarf

C. Giant molecular cloud → protostar → T Tauri star → main sequence → red giant branch → helium flash → horizontal branch → asymptotic giant branch → planetary nebula→ white dwarf

D. Giant molecular cloud → protostar → main sequence → T Tauri star → helium flash → horizontal branch → asymptotic giant branch → planetary nebula→ red giant branch → white dwarf

Options :

8995146660. 1

8995146661. 2

8995146662. 3

8995146663. 4

Question Number : 77 Question Id : 8995141676 Question Type : MCQ Option Shuffling : No Display Ques

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Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Three stars of 5 $M_\odot$, 3 $M_\odot$ and 1 $M_\odot$ are born in the same molecular cloud.

Choose the correct answer for their metallicities.

A. Their metallicities are similar

B. Their metallicities increase linearly with mass

C. Their metallicities decrease linearly with mass

D. The metallicities of 1 $M_\odot$ and 3 $M_\odot$ stars are similar but that of the $5M_\odot$ star higher

Options :
8995146664. 1
8995146665. 2
8995146666. 3
8995146667. 4

Question Number : 78 Question Id : 8995141677 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

The luminosity and main sequence life span of a 10 $M_\odot$ main sequence star are

A. 60 $L_\odot$ and 3×10^6 years

B. 600 $L_\odot$ and 5×10^9 years

C. 1000 $L_\odot$ and 4×10^8 years

D. 10000 $L_\odot$ and 2×10^7 years

Options :
8995146668. 1
8995146669. 2
8995146670. 3
8995146671. 4

Question Number : 79 Question Id : 8995141678 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

In the Sun the pp chain dominates energy generation while for a star about 1.5 times or more heavier than the Sun the CNO cycle dominates. This is because

A. only protons are available in the interior of the Sun

B. there is not enough O in the interior of the Sun

C. the core temperature in the solar interior is too low for the CNO cycle

D. the core temperature in the solar interior is too high for the CNO cycle

Options :
8995146672. 1
8995146673. 2
8995146674. 3
8995146675. 4

Question Number : 80 Question Id : 8995141679 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

A photon generated in the interior of the Sun has to make its way to the surface. The time scale taken for a photon to make its way to the surface from the core is approximately (choose the closest answer)

A. 30000 years

B. 3000 years

C. 300 years

D. 30 years

Options :
8995146676. 1
8995146677. 2
8995146678. 3
8995146679. 4

Question Number : 81 Question Id : 8995141680 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Assuming the Sun to be of uniform density, which is not strictly correct, estimate the magnitude of the gravitational potential energy of the Sun.

A. 2×10^{31} J

B. 2×10^{34} J

C. 2×10^{37} J

D. 2×10^{41} J

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Options :

8995146680. 1

8995146681. 2

8995146682. 3

8995146683. 4

Question Number : 82 Question Id : 8995141681 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Energy is carried in the outer part of the Sun from about 0.7 solar radius to the surface by

A. convection

B. radiation

C. conduction

D. free flow of photons

Options :

8995146684. 1

8995146685. 2

8995146686. 3

8995146687. 4

Question Number : 83 Question Id : 8995141682 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

Estimate the escape velocity from the Sun as a fraction of the velocity of light.

A. 2×10^{-3}

B. 2×10^{-2}

C. 2×10^{-1}

D. 0.5

Options :
8995146688. 1
8995146689. 2
8995146690. 3
8995146691. 4

Question Number : 84 Question Id : 8995141683 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The flux measured from two stars is $5{\cdot}3 \times 10^{-14}$ W and $3{\cdot}9 \times 10^{-14}$ W, respectively. The difference in apparent magnitude of these stars is

A. 0.325

B. 1.4

C. 0.855

D. 0.13

Options :

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8995146692. 1
8995146693. 2
8995146694. 3
8995146695. 4

Question Number : 85 Question Id : 8995141684 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The distance modulus of a globular cluster is 16.505. The distance to the cluster is

A. 18 kpc

B. 20 kpc

C. 25 kpc

D. 22 kpc

Options :
8995146696. 1
8995146697. 2
8995146698. 3
8995146699. 4

Question Number : 86 Question Id : 8995141685 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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A star is found to have luminosity that is 500 times that of the Sun. If its effective temperature is 6250 K, then its radius (in terms of solar radius) is

A. 0.2705

B. 270.5

C. 27.05

D. 2.705

Options :
8995146700. 1
8995146701. 2
8995146702. 3
8995146703. 4

Question Number : 87 Question Id : 8995141686 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The absorption lines in stellar spectra are caused by

A. atomic transitions from high excited states to low energy states.

B. outer layers of the star which are cooler compared to inner layers.

C. scattering of radiation by atoms and molecules in the corona of the star.

D. the angle subtended by the viewing plane.

Options :
8995146704. 1
8995146705. 2

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8995146706. 3
8995146707. 4

Question Number : 88 Question Id : 8995141687 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following variable stars helps in direct determination of masses and radii of stars from the light curve geometry?

A. RR Lyraes

B. classical cepheids

C. Mira Variables

D. Eclipsing binaries

Options :
8995146708. 1
8995146709. 2
8995146710. 3
8995146711. 4

Question Number : 89 Question Id : 8995141688 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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The star Algol is observed to have a proper motion of 3.2 milli-arcsec/yr, radial velocity of 4 km/s and parallax of 36.28 milli-arcsec. The distance to Algol is

A. 27.6 pc

B. 312.5 pc

C. 250.0 pc

D. 195.2 pc

Options :
8995146712. 1
8995146713. 2
8995146714. 3
8995146715. 4

Question Number : 90 Question Id : 8995141689 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The mass of Vega is 2 $M_\odot$, radius is 3 $R_\odot$ and luminosity if 60 $L_\odot$. The thermal timescale of Vega is

A. 2×10^3 years

B. 4×10^5 years

C. 5×10^6 years

D. 3×10^7 years

Options :

8995146716. 1
8995146717. 2
8995146718. 3
8995146719. 4

Question Number : 91 Question Id : 8995141690 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

At the beginning of a solar cycle

A. Sunspots are concentrated near the equator

B. Sunspots appear at relatively higher latitudes (30 - 40 degrees)

C. The number of Sunspots is at a maximum

D. sunspots appear uniformly at all latitudes

Options :

8995146720. 1
8995146721. 2
8995146722. 3
8995146723. 4

Question Number : 92 Question Id : 8995141691 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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The time of sunrise as seen from the earth

A. changes everyday

B. stays the same for a given longitude

C. does not depend on the latitude

D. remains the same for the same latitude

Options :
8995146724. 1
8995146725. 2
8995146726. 3
8995146727. 4

Question Number : 93 Question Id : 8995141692 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If the Earth (along with the Moon at the same distance from the earth) was moved to a distance closer to the Sun such that the new distance was half of that of the original distance, then

A. the angular size of the Sun will become half as before

B. the angular size of the Sun will become double as that of before

C. the solar eclipse will remain the same

D. the effect of the Sun on the Moon will remain unchanged

Options :

8995146728. 1
8995146729. 2
8995146730. 3
8995146731. 4

Question Number : 94 Question Id : 8995141693 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The observers in two cities, Delhi and Mumbai, observing the star Sirius, will measure

A. the same altitude and azimuth for Sirius
B. different RA for Sirius
C. different Dec for Sirius
D. same RA and Dec for Sirius

Options :
8995146732. 1
8995146733. 2
8995146734. 3
8995146735. 4

Question Number : 95 Question Id : 8995141694 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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A star is a celestial object that

A. burns nuclear fuel and is bound by kinetic pressure

B. shines brightly and is never in hydrostatic equilibrium

C. emits radiation at optical wavelengths only

D. burns nuclear fuel and is bound by self gravity

Options :
8995146736. 1
8995146737. 2
8995146738. 3
8995146739. 4

Question Number : 96 Question Id : 8995141695 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The temperature of the core of the Sun is about

A. little more than one billion degrees Celsius

B. little more than ten million degrees Celsius

C. little more than one million degrees Celsius

D. five hundred thousand degrees Celsius

Options :
8995146740. 1
8995146741. 2
8995146742. 3
8995146743. 4

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Question Number : 97 Question Id : 8995141696 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The number of constellations officially recognized by the IAU is

A. 88

B. 62

C. 75

D. 108

Options :
8995146744. 1
8995146745. 2
8995146746. 3
8995146747. 4

Question Number : 98 Question Id : 8995141697 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

For the Sun, the following statement is incorrect:

A. the density of the core is more than that of the photosphere

B. the density of the photosphere is more than that of the corona.

C. the density of the chromosphere is less than that of the core.

D. the density of the chromosphere is less than that of the corona.

Options :
8995146748. 1

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8995146749. 2
8995146750. 3
8995146751. 4

Question Number : 99 Question Id : 8995141698 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The location of the zenith for an observer

A. remains the same for all observers

B. rotates along with the rotation of the celestial sphere

C. is defined differently for different coordinate systems

D. can be measured by measuring the nadir

Options :
8995146752. 1
8995146753. 2
8995146754. 3
8995146755. 4

Question Number : 100 Question Id : 8995141699 Question Type : MCQ Option Shuffling : No Display Qu
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

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For a more precise measurement of the parallax of a given star, the minimum observation time required on Earth is

A. 1 month

B. 3 months

C. 4 months

D. 6 months

Options :
8995146756. 1
8995146757. 2
8995146758. 3
8995146759. 4