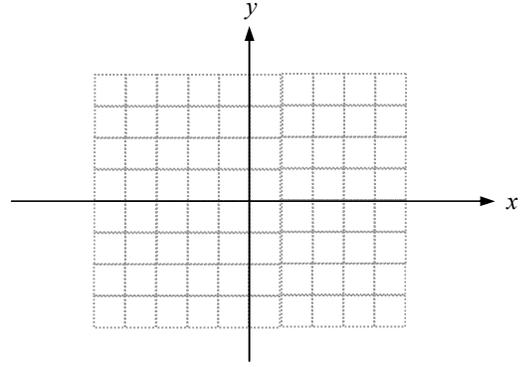
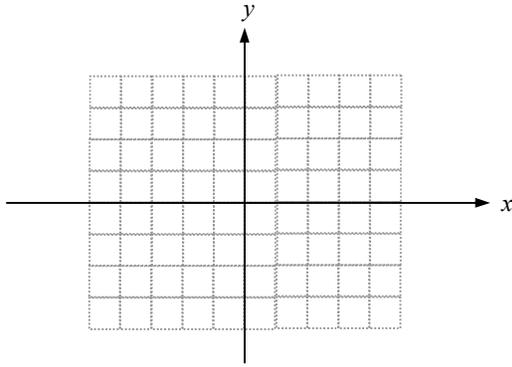




4. Plot (freehand) graphs for  $x^2 - y = 2x$  and  $5x + 7 = 12y$  in the gridlines provided below.



5. Determine the (a) length, (b) co-ordinates of midpoint, (c) perpendicular distance from origin of the portion of line  $5x + y = 10$  intercepted between the  $x$ - and  $y$ -axes.

6. Determine the equation of the circle that touches the  $x$ - and  $y$ -axes at distance 2 and  $-4$  respectively from origin.

7. Perform the integration of  $(\tan x)^{0.5}/(\sin x \cos x)$  between  $x = 0$  and  $x = \pi/4$ .

8. Determine  $C_1$  and  $C_2$  for  $f(x) = e^{ax} [C_1 \cos(bx) + C_2 \sin(bx)]$ , if  $f(0) = 0$  and  $f'(0) = v_0$ .

## Section B: Physics

[Full Marks =  $6 \times 5 = 30$ ]

9. (a) What are the four fundamental forces of nature? (2)  
(b) What is absolute zero temperature in  $^{\circ}C$  and  $^{\circ}F$ ? (3)

10. Calculate the (a) stress, (b) longitudinal strain, (c) transverse strain in a wire of diameter 0.25 in, if it is subjected to a tensile force of 1000 lb [Given: Modulus of elasticity =  $20 \times 10^6$  lb/in<sup>2</sup>, Poisson's ratio = 0.25].

11. For a stone of mass 2 kg allowed to fall freely from a height of 50 m above ground, calculate the  
(a) Initial Potential energy, (b) Time required to reach ground, (c) Kinetic energy when it reaches ground.

12. Show the necessary calculations to convert

- (a)  $1000 \text{ kg/m}^3$  to  $\text{lb/ft}^3$                       (b) 1 Light-year to kilometer.

13. Two equal forces act perpendicular to each other to move a mass of 1000 kg a distance 10 m in 10 seconds.

Determine the

- (a) Magnitude of the forces, (b) Distance the mass would move if the forces acted parallel to each other.

14. Two ends of a cell are connected in a parallel connection with two wires of  $5 \Omega$  and  $10 \Omega$  resistance. If the current flow through the cell is 2 Amperes, calculate the current flow if the two wires are connected in series.

## Section C: English

[Full Marks = 20]

15. Write an essay on 'Ekushey Boi Mela' (within 100 words).

(10)

16. Translate the following passage into English

(5)

তথ্য ও যোগাযোগ প্রযুক্তির উৎকর্ষতার পাশাপাশি ভূরাজনীতিতে ক্রমবর্ধমান অনিশ্চয়তার ফলে আধুনিক বিশ্বে বৈষম্য ও বেকারত্ব বাড়ার ঝুঁকি আছে। দ্রুত পরিবর্তনের এই যুগে কর্মসংস্থানের প্রতিযোগিতামূলক বাজারের জন্য তৈরি হতে তরুণদের জন্য মানসম্পন্ন শিক্ষা নিশ্চিত করা জরুরি। একই সাথে জ্ঞানভিত্তিক অর্থনীতির বিকাশে পরিকল্পনা নিতে হবে, যেখানে বৈশ্বিক পরিবর্তনের সাথে খাপ খাইয়ে নিতে সৃজনশীলতাকে বিশেষ গুরুত্ব দিতে হবে।

17. Read the following passage carefully and tick mark corresponding circle to choose the correct or the best one from the four answers following each question: (5)

Supernovas are the most powerful and spectacular outbursts known on nature. What is called a Type II supernova is due to the collapse of a massive star, at least eight times as massive as the sun that has used up its main nuclear fuel and produced a nickel-iron core. When this core can no longer support the pressure of the star's outer layers, it collapses to form a neutron star of immense density. Multitudes of neutrons are produced in the collapsed star, which pass directly through the star into space, and this release of neutrons causes the core to respond with a shock wave that moves outward. When it meets the material that is falling inward, the result is a catastrophic explosion. Sometimes most of the star's material is blown away, leaving only a small, incredibly dense remnant that may be a neutron star or, in extreme cases, a black hole. A supernova remnant (SNR) may be detectable as a pulsar. The 1987 supernova in the Large Cloud of Magellan had low peak luminosity by supernova standards. Only about 250 million times that of the sun at its brightest, the supernova shone as a star between magnitudes 2 and 3, even though it was 170,000 light-years away.

- (a) The word 'remnant' in the passage is closest in meaning to
- relic
  - characteristic
  - specter
  - remainder
- (b) The word 'detectable' in the passage is closest in meaning to
- assumed
  - know
  - perceptible
  - audible
- (c) According to the paragraph, what marks the beginning of a supernova?
- A star has grown too big
  - A star is born
  - The neutrons of a star become very dense
  - A massive star uses up its main nuclear fuel
- (d) According to the paragraph, which of the following is NOT true about the 1987 supernova?
- It was located in the Large Cloud of Magellan
  - It was 170,000 light-years away
  - It shone as a star between magnitudes 3 and 4
  - It had a low peak luminosity
- (e) What can be inferred from the paragraph about supernovas?
- They only happen to pulsars
  - The sun is a remnant of a supernova
  - They occur when two stars collide
  - They sometimes result in a black hole

**Section D: Aptitude**[Full Marks =  $10 \times 1 = 10$ ]

18. Complete the following series

?, ?, 10, 8, 15, 12, 20, 16, 25, 20

19. How many days are there in  $x$  weeks  $x$  days?

- (a)  $14x$                       (b)  $8x$                       (c)  $7x^2$                       (d) 7

20. The angles of depression and elevation of the top of a 10-ft high wall from the top and bottom of a tree are both  $45^\circ$ . What is the height of the tree, if the bottom of the tree and the wall are at the same level?

- (a) 10 ft                      (b) 20 ft                      (c) 30 ft                      (d) None of these

21. How many times will the hands of a clock coincide in a day?

- (a) 24                      (b) 22                      (c) 20                      (d) 21

22. A rectangular field has to be fenced on three sides leaving a side of 25 feet uncovered. If the area of the field is 1000 sq. feet, how many feet of fencing will be required?

- (a) 130                      (b) 105                      (c) 40                      (d) 90

23. What is the probability of getting an even product from two throws of a dice?

- (a)  $\frac{17}{36}$                       (b)  $\frac{1}{3}$                       (c)  $\frac{3}{4}$                       (d)  $\frac{11}{25}$

24. Product of two 2-digit numbers is 2028 and their Highest Common Factor (HCF) is 13. What are the numbers?

- (a) 26, 78                      (b) 39, 52                      (c) 13, 156                      (d) 31, 658.

25. Which of the following are in descending order of their value?

(a)  $\frac{7}{8}, \frac{4}{7}, \frac{3}{7}, \frac{2}{5}, \frac{1}{4}, \frac{1}{6}$

(b)  $\frac{1}{4}, \frac{2}{5}, \frac{4}{7}, \frac{1}{6}, \frac{3}{7}, \frac{7}{8}$

(c)  $\frac{1}{4}, \frac{2}{5}, \frac{4}{7}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}$

(d) None of these

26. A student must obtain 40% of the total marks to pass. He got 270 marks and failed by 50 marks. The total mark is

27. If  $\log_{10} 2 + \log_{10} (x + 2) = 1$ , then  $x$  is equal to

- (a) 1                      (b) 2                      (c) 3                      (d) 4

**University of Asia Pacific**  
**School of Engineering**  
**Admission Test Spring 2017 (Set 2)**

Date: 4.2.17

Time: 90 minutes

Full Marks: 100

Name:

Serial No.:

---

**(Answer all the questions. Assume reasonable value for missing data, if necessary)**

---

**Section A: Aptitude**

[Full Marks =  $10 \times 1 = 10$ ]

1. Complete the following series

?, ?, 10, 8, 15, 12, 20, 16, 25, 20

2. How many days are there in  $x$  weeks  $x$  days?

(a)  $14x$                       (b)  $8x$                       (c)  $7x^2$                       (d) 7

3. The angles of depression and elevation of the top of a 10-ft high wall from the top and bottom of a tree are both  $45^\circ$ . What is the height of the tree, if the bottom of the tree and the wall are at the same level?

(a) 10 ft                      (b) 20 ft                      (c) 30 ft                      (d) None of these

4. How many times will the hands of a clock coincide in a day?

(a) 24                      (b) 22                      (c) 20                      (d) 21

5. A rectangular field has to be fenced on three sides leaving a side of 25 feet uncovered. If the area of the field is 1000 sq. feet, how many feet of fencing will be required?

(a) 130                      (b) 105                      (c) 40                      (d) 90

6. What is the probability of getting an even product from two throws of a dice?

(a)  $\frac{17}{36}$                       (b)  $\frac{1}{3}$                       (c)  $\frac{3}{4}$                       (d)  $\frac{11}{25}$

7. Product of two 2-digit numbers is 2028 and their Highest Common Factor (HCF) is 13. What are the numbers?

(a) 26, 78                      (b) 39, 52                      (c) 13, 156                      (d) 31, 658.

8. Which of the following are in descending order of their value?

(a)  $\frac{7}{8}, \frac{4}{7}, \frac{3}{7}, \frac{2}{5}, \frac{1}{4}, \frac{1}{6}$

(b)  $\frac{1}{4}, \frac{2}{5}, \frac{4}{7}, \frac{1}{6}, \frac{3}{7}, \frac{7}{8}$

(c)  $\frac{1}{4}, \frac{2}{5}, \frac{4}{7}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}$

(d) None of these

9. A student must obtain 40% of the total marks to pass. He got 270 marks and failed by 50 marks. The total mark is

10. If  $\log_{10} 2 + \log_{10}(x + 2) = 1$ , then  $x$  is equal to

(a) 1                      (b) 2                      (c) 3                      (d) 4

## Section B: English

[Full Marks = 20]

11. Write an essay on 'Ekushey Boi Mela' (within 100 words).

(10)

12. Translate the following passage into English

(5)

তথ্য ও যোগাযোগ প্রযুক্তির উৎকর্ষতার পাশাপাশি ভূরাজনীতিতে ক্রমবর্ধমান অনিশ্চয়তার ফলে আধুনিক বিশ্বে বৈষম্য ও বেকারত্ব বাড়ার ঝুঁকি আছে। দ্রুত পরিবর্তনের এই যুগে কর্মসংস্থানের প্রতিযোগিতামূলক বাজারের জন্য তৈরি হতে তরুণদের জন্য মানসম্পন্ন শিক্ষা নিশ্চিত করা জরুরি। একই সাথে জ্ঞানভিত্তিক অর্থনীতির বিকাশে পরিকল্পনা নিতে হবে, যেখানে বৈশ্বিক পরিবর্তনের সাথে খাপ খাইয়ে নিতে সৃজনশীলতাকে বিশেষ গুরুত্ব দিতে হবে।

13. Read the following passage carefully and tick mark corresponding circle to choose the correct or the best one from the four answers following each question: (5)

Supernovas are the most powerful and spectacular outbursts known on nature. What is called a Type II supernova is due to the collapse of a massive star, at least eight times as massive as the sun that has used up its main nuclear fuel and produced a nickel-iron core. When this core can no longer support the pressure of the star's outer layers, it collapses to form a neutron star of immense density. Multitudes of neutrons are produced in the collapsed star, which pass directly through the star into space, and this release of neutrons causes the core to respond with a shock wave that moves outward. When it meets the material that is falling inward, the result is a catastrophic explosion. Sometimes most of the star's material is blown away, leaving only a small, incredibly dense remnant that may be a neutron star or, in extreme cases, a black hole. A supernova remnant (SNR) may be detectable as a pulsar. The 1987 supernova in the Large Cloud of Magellan had low peak luminosity by supernova standards. Only about 250 million times that of the sun at its brightest, the supernova shone as a star between magnitudes 2 and 3, even though it was 170,000 light-years away.

- (a) The word 'remnant' in the passage is closest in meaning to
- relic
  - characteristic
  - specter
  - remainder
- (b) The word 'detectable' in the passage is closest in meaning to
- assumed
  - know
  - perceptible
  - audible
- (c) According to the paragraph, what marks the beginning of a supernova?
- A star has grown too big
  - A star is born
  - The neutrons of a star become very dense
  - A massive star uses up its main nuclear fuel
- (d) According to the paragraph, which of the following is NOT true about the 1987 supernova?
- It was located in the Large Cloud of Magellan
  - It was 170,000 light-years away
  - It shone as a star between magnitudes 3 and 4
  - It had a low peak luminosity
- (e) What can be inferred from the paragraph about supernovas?
- They only happen to pulsars
  - The sun is a remnant of a supernova
  - They occur when two stars collide
  - They sometimes result in a black hole

### Section C: Physics

[Full Marks =  $6 \times 5 = 30$ ]

14. (a) What are the four fundamental forces of nature? (2)  
(b) What is absolute zero temperature in  $^{\circ}C$  and  $^{\circ}F$ ? (3)

15. Calculate the (a) stress, (b) longitudinal strain, (c) transverse strain in a wire of diameter 0.25 in, if it is subjected to a tensile force of 1000 lb [Given: Modulus of elasticity =  $20 \times 10^6$  lb/in<sup>2</sup>, Poisson's ratio = 0.25].

16. For a stone of mass 2 kg allowed to fall freely from a height of 50 m above ground, calculate the  
(a) Initial Potential energy, (b) Time required to reach ground, (c) Kinetic energy when it reaches ground.

17. Show the necessary calculations to convert

- (a)  $1000 \text{ kg/m}^3$  to  $\text{lb/ft}^3$                       (b) 1 Light-year to kilometer.

18. Two equal forces act perpendicular to each other to move a mass of 1000 kg a distance 10 m in 10 seconds.

Determine the

- (a) Magnitude of the forces, (b) Distance the mass would move if the forces acted parallel to each other.

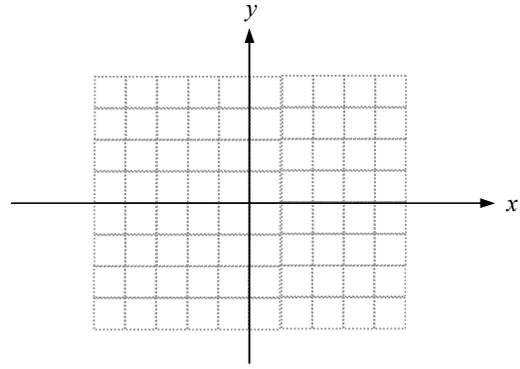
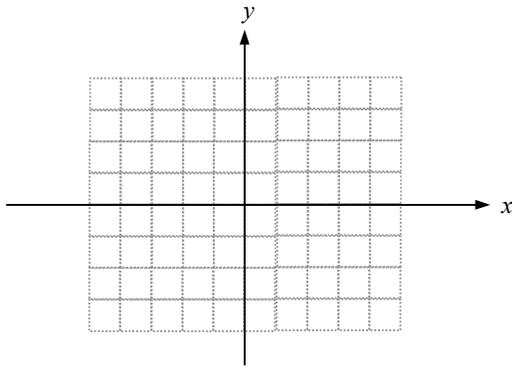
19. Two ends of a cell are connected in a parallel connection with two wires of  $5 \Omega$  and  $10 \Omega$  resistance. If the current flow through the cell is 2 Amperes, calculate the current flow if the two wires are connected in series.

**Section D: Mathematics**

[Full Marks =  $8 \times 5 = 40$ ]

20. Roots of the quadratic equation  $x^2 + px + q = 0$  are  $-2$  and  $-15$ . Determine its roots if the value of  $q$  is doubled.
21. If  $\log_{10}(x) + 3 = 2 \ln(y)$ , express  $x$  in terms of  $y$ .
22. 18 seats at an examination hall at UAP are to be filled by 10 candidates of CE and 8 of EEE. In how many ways can they be seated so that no two EEE candidates will sit next to each other?

23. Plot (freehand) graphs for  $x^2 - y = 2x$  and  $5x + 7 = 12y$  in the gridlines provided below.



24. Determine the (a) length, (b) co-ordinates of midpoint, (c) perpendicular distance from origin of the portion of line  $5x + y = 10$  intercepted between the  $x$ - and  $y$ -axes.

25. Determine the equation of the circle that touches the  $x$ - and  $y$ -axes at distance 2 and  $-4$  respectively from origin.

26. Perform the integration of  $(\tan x)^{0.5}/(\sin x \cos x)$  between  $x = 0$  and  $x = \pi/4$ .

27. Determine  $C_1$  and  $C_2$  for  $f(x) = e^{ax} [C_1 \cos(bx) + C_2 \sin(bx)]$ , if  $f(0) = 0$  and  $f'(0) = v_0$ .

**University of Asia Pacific**  
**Admission Test Fall 2016 (Set 1)**

Date: 8.10.16  
Name:

Time: 90 minutes

Full Marks: 100  
Serial No.:

---

**(Answer all the questions. Assume reasonable value for missing data, if necessary)**

**Section A: Mathematics**

[Full Marks = 42]

1. Calculate  $x$  and  $y$  if  $4x + 4y = 20$ , and  $x^2 - 5 = y^2$ . (3)

2. Calculate  $x$  and  $y$  if  $z^3 = \sqrt{36^5}$ ,  $x = \log_6(z) - 2/3$ , and  $y = x^{-5}$ . (3)

3.  $5 + 5/3 + 5/9 + 5/27 + \dots \infty = ?$  (3)

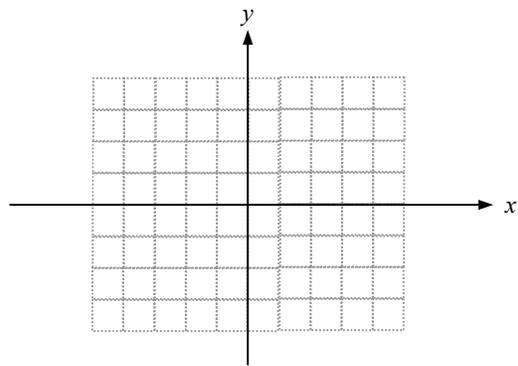
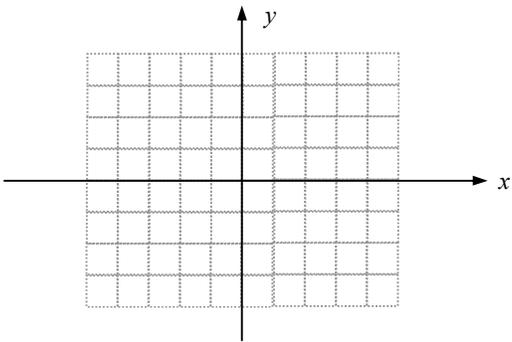
4. If  ${}^nC_2 = {}^nC_3$ , calculate the value of  ${}^6C_{n-1}$ . (3)

5. Evaluate:  $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{x^2 - x}$  (4)

6. Determine  $\frac{dy}{dx}$  if  $e^{xy} = e^{4x} - e^{5y}$  (5)

7. Integrate:  $\int \frac{\cos y}{\sin^2 y + \sin y - 6} dy$  (5)

8. Plot (freehand) graphs for  $y^2 = 5(x - 1)$  and  $x/3 - 1 = y$  in the gridlines provided below. (4)



9. Determine the equation of the chord of the circle  $x^2 + y^2 - 6x + 10y - 21 = 0$  which bisects at  $(1, -2)$ . (3)

10. Determine the equation of a straight line passing through the point of intersection of the straight lines  $x + 2y = 1$  and  $2x + 3y = -2$ , whose slope is  $45^\circ$ . (3)

11. Calculate the area of triangle ABC if the coordinates of its three vertices are A(1,2), B(3,-4) and C(5,8). (3)

12. Determine the coordinates of a point on the parabola  $y^2 = 8x$  whose distance from the origin is 8. (3)

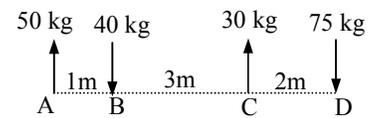
## Section B: Physics

[Full Marks = 28]

13. What is the difference between a permanent magnet and a temporary magnet? (3)
14. Shakib Al Hasan hit a cricket ball with a velocity of 30 m/s at an inclination of  $30^\circ$  with horizontal. The boundary distance was 75 m. If the ball followed parabolic path, could he be able to score a 'six'? (5)
15. Fielder 'F' threw a cricket ball at a constant speed of 15 m/s and hit the stumps from a distance 30 m. The batsman 'B' was 15 m from the stumps and had an initial speed of 6 m/s when 'F' threw the ball. If 'B' ran with an acceleration of  $1.0 \text{ m/s}^2$ , determine if 'B' would be 'run out'. (5)

16. If a 25 kg load is applied on Spring A, it elongates 0.25 m, but it elongates 0.30 m after being attached to another Spring B in series. Determine the spring constant of both springs. (5)

17. A series of loads are shown in below. Determine the magnitude and location of the resultant force. (5)



18. Messi (weighing 67 kg) runs with the ball at 8.0 m/s when a 60 kg defender runs in the same direction at 10.0 m/s to jump on his back. Determine the speed of the two players immediately after the collision. (5)

## Section C: English

[Full Marks = 20]

19. Write an essay on 'Nobel Prize' (within 100 words).

(10)

20. Translate the following passage into English

(5)

ই-মেইল তথা ইলেক্ট্রনিক মেইল হল ডিজিটাল বার্তা যা কম্পিউটার নেটওয়ার্কের মাধ্যমে প্রেরণ করা হয়। ১৯৭২ খ্রীস্টাব্দে সর্বপ্রথম ইলেক্ট্রনিক মেইল প্রেরণ করা হয়। ই-মেইল পেতে প্রথম দিকের ই-মেইল ব্যবস্থায় প্রেরক এবং প্রাপক দুজনকেই অনলাইনে থাকতে হত। এখনকার ই-মেইলগুলোতে এই সমস্যা নেই। ই-মেইল সার্ভারগুলো মেইল গ্রহণ করে এবং সংরক্ষণ করে পরে পাঠায়। ব্যবহারকারী বা প্রাপককে অথবা কম্পিউটারকে অনলাইনে থাকার প্রয়োজন হয় না।

21. Read the following passage carefully and tick mark corresponding circle to choose the correct or the best one from the four answers following each question: (5)

A supernova is a brief stellar explosion so luminous that it can briefly outshine an entire galaxy. While the explosion itself takes less than fifteen seconds, supernovae take weeks or months to fade from view; during that time, a supernova can emit an amount of energy equivalent to the energy the sun is expected to radiate over its entire lifespan. Supernovae generate enough heat to create heavy elements, such as mercury, gold and silver. Although supernovae explode frequently, few of them are visible (from Earth) to the naked eye. In 1604 in Padua, Italy, a supernova became visible, appearing as a star so bright that it was visible in daylight for more than a year. Galileo, who lectured at the university, gave several lectures widely attended by the public. The lectures not only sought to explain the origin of the 'star' (some posited that perhaps it was merely 'vapor near the earth'), but seriously undermined the views of many philosophers that the heavens were unchangeable. This idea was foundational to a worldview underpinned by a central and all-important Earth, with heavenly bodies merely rotating around it.

- a) The primary purpose of the passage is to
- give the history of supernovae
  - describe a shift in thought as a result of a natural event
  - compare two opposing views about supernovae
  - explain how science and philosophy interrelate
- b) Which of the following can be inferred by the passage?
- Supernovae can take over a year to fade from view.
  - Prior to 1604, no one had ever seen a supernova.
  - Galileo convinced philosophers of the incorrectness of their views.
  - Supernovae emits insufficient energy
- c) What is the synonym of the word 'heavenly'?
- Nearly
  - Divine
  - Earthly
  - Mortal
- d) The author mentions which of the following as a result of the supernova of 1604?
- Galileo explained the origin of the supernova.
  - The public was interested in hearing lectures about the phenomenon.
  - Galileo's lectures were opposed by philosophers.
  - Those who thought the supernova was 'vapor' were proved wrong.
- e) The heat generated from Supernovae helps in creating\_\_\_\_\_.
- Galaxy
  - Vapor
  - Liquids
  - Dense metals

## Section D: Aptitude

[Full Marks =  $1 \times 10 = 10$ ]

22. The sum of ten consecutive odd numbers is always divisible by

- (i) 20            (ii) 30            (iii) 40            (iv) 50

23. In how many ways can a team of 18 be chosen out of a batch of 20 players?

- (i) 2            (ii) 190            (iii) 360            (iv) 380

24. What will be the 10<sup>th</sup> term in the series 5, 10, 20,....?

- (i) 2034            (ii) 2560            (iii) 3020            (iv) 4123

25. If 26<sup>th</sup> March 2006 was a Friday, which day was 1<sup>st</sup> May 2008?

26. A 575 meter long train crosses a tunnel of 325 meter in 90 sec. What is the speed of the train in kmph?

27. Two buses A and B leave the same bus depot, A towards the North and B towards the East. After four hours the distance between the two buses is 100 km. Determine the speed of the bus A if it travels at a speed of 5 km/hr more than that of bus B.

28. A monkey starts climbing up a 20 ft tall tree. Each minute it hops 3 ft and slips back 2 ft. How much time would it take the monkey to reach the top?

29. Some months have 30 days, some have 31 days, but how many months have 28 days?

- (i) 2            (ii) 3            (iii) 11            (iv) 12

30. A man travelled 6 miles towards east and then turned right to travel 3 miles. Again he turned right to travel 4 miles. How far is he now from starting point?

- (i) 3 miles            (ii) 3.2 miles            (iii) 3.4 miles            (iv) 3.6 miles

31. Everybody has to shake hand with others at a party. If the total number of handshake is 15, what is the number of persons at the party?