University of Asia Pacific
Admission Test ………….

Date: Time: 90 minutes Full Marks: 100
Name: 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)

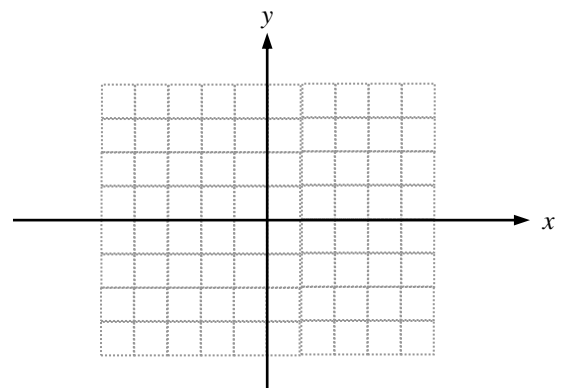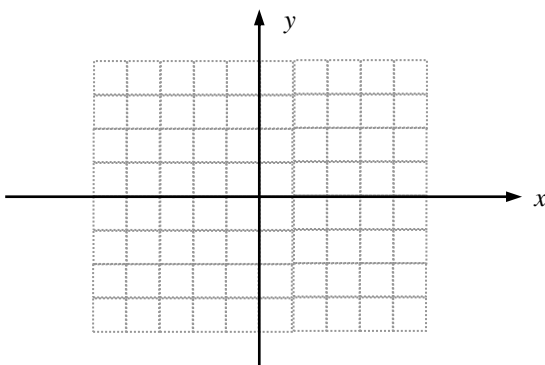3. $5 + 5/3 + 5/9 + 5/27 + \ldots\ldots\ldots\infty =$? (3)

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

5. **Evaluate:** $\lim_{x \to 0} \dfrac{3^x - 2^x}{x^2 - x}$ (4)

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

7. Integrate: $\displaystyle\int \dfrac{\cos y}{\sin^2 y + \sin y - 6}\, dy$ (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 if 45°. (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° 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 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)

50 kg   40 kg   30 kg   75 kg

A   1m   B   3m   C   2m   D
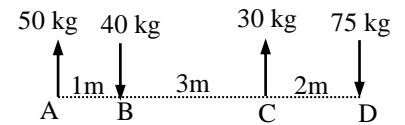
18. Messi (weighing 67 kg) runs with the ball at 8.0 m/s when a 60 kg defender runs in the same direction at 10.0 m/s to jump on his back. Determine the speed of the two players immediately after the collision. (5)

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 সংরক্ষন 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 × 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 18 be chosen out of a batch of 20 players?

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

24. What will be the 10th term in the series 5, 10, 20.....?

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

25. If 26th March 2006 was a Friday, which day was 1st 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?