University of Asia Pacific
Sample Question: Bachelor of Civil Engineering

Date: Time: 90 minutes   Full Marks: 100

Name: Application ID.:

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

Section A: Mathematics   [42 Marks]

(13) If $f(x) = x\, x^x$, determine the value of $f'(1)$.

(23) Compute

$$\lim_{x \to \infty} \left(\frac{7x^2 + x - 10}{2x^2 - 5x} \right)$$

3. Integrate: $\int e^x (1 + 2e^x)^4\, dx$

4.   Calculate x if $log_2(0.25) + log_3(81) + log_x(25) = 0$.   (4)

5.   Determine how many mobile phone numbers (beginning with 017) Grameenphone can possibly provide   (4)
     among its customers.

6.   If $x = 1$ is a solution of the equation $x^3 - 4x^2 + 4x - 1 = 0$, determine the other two solutions.   (4)

7.   Determine the co-efficient of x^n in the expression of $1/\{(3-x)(4-x)\}$ (4)

8.   Plot (freehand) graphs for $2x + 5y = 10$ and $y = x^2 - 4$ in the gridlines provided below.   (4)
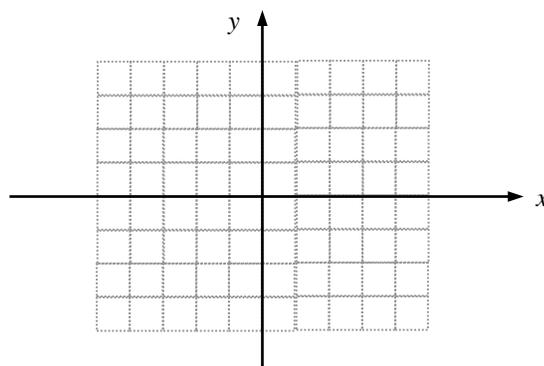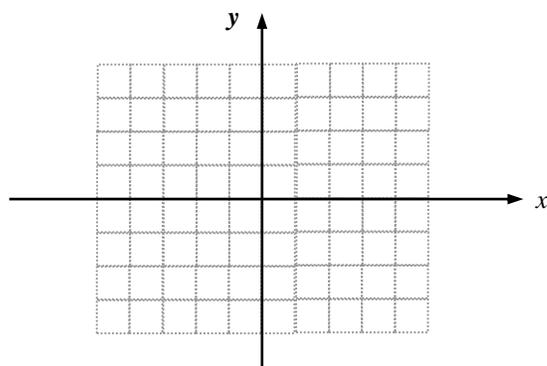
9. If the points (6, −5), (−3, 10) and (a, 0) are on the same straight line, determine the value of a. (3)

10. Determine if the two straight lines: $x/4 - y/8 = 1$, and $3x + 6y = 5$ are parallel or perpendicular or neither. (3)

11. A circle with perimeter 10π is inscribed in a square. Determine the perimeter of the square. (3)

12. Determine the equation of a circle which has the center at (5, 0) and touches the line: $3x + 4y = 0$. (3)

Section B: Physics [28 Marks]

13. Convert the power of a 60 Watt light-bulb to lb-ft/sec.

(3)

14. Particle A of mass 5 kg travels straight with velocity 4 m/s to hit a stationary particle B of mass 6 kg. (5)
   If particle A stops after the collision, what speed does particle B move with?

15. When a steel wire of cross-section 2 mm^2 is loaded by 10 kg, its length becomes 6 m.
    If the wire is 5.99m long when the load is withdrawn, calculate Young's modulus of the wire material. (5)

16. A 2 kg stone is thrown downward from the top of a 30m high building with initial velocity of 1 m/s.
Calculate the kinetic energy when the stone travels half the distance. (5)

17. A 100 N force is applied at an angle 30° with horizontal to move a 50 kg object a horizontal distance 5m.
Determine the amount of work done by the applied force. (5)

F = 100 N

30°
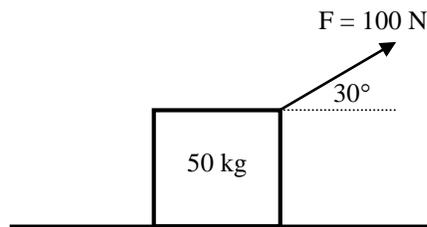
50 kg

18. Calculate the distance r_2 to balance the lever system shown in the figure below, (5)
if W_1 = 20 kg, W_2 = 50 kg and r_1 = 10 ft.

r_1 r_2

W_1 W_2
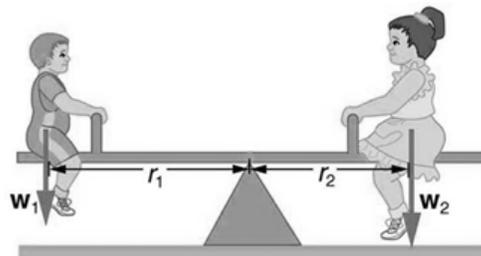
19. Write an essay on '*Spirit of 1971*' (within 100 words). (10)

20. Translate the following passage into English (5)

বর্তমানে মূলত গ্রীনহাউসের কারনে পৃথিবীর তাপমাত্রা বাড়ছে যার পরিণাম হচ্ছে সমুদ্র পৃষ্ঠের উচ্চতা বৃদ্ধি। এই উচ্চতা দ্রুত বাড়লে বাংলাদেশের একটি বিশাল অংশ পানিতে ডুবে যাওয়ার আশংকা আছে। এই বিপর্যয়ের বিরুদ্ধে আমাদের প্রাথমিক করনীয় গুলোর মধ্যে থাকবে বাংলাদেশের উপকূলে উপকূলে সমুদ্র পৃষ্ঠের গতিশীলতা নির্ধারণ করা।

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

When another old cave is discovered in the south of France, it is not usually news. Rather, it is an ordinary event. Such discoveries are so frequent these days that hardly anybody pays heed to them. However, when the Lascaux cave complex was discovered in 1940, the world was amazed. Painted directly on its walls were hundreds of scenes showing how people lived thousands of years ago. The scenes show people hunting animals, such as bison or wild cats. Other images depict birds and most noticeably, horses, which appear in more than 300 wall images, by far outnumbering all other animals. Early artists drawing these animals accomplished a monumental and difficult task. They did not limit themselves to the easily accessible walls but carried their painting materials to spaces that required climbing steep walls or crawling into narrow passages in the Lascaux complex. Unfortunately, the paintings have been exposed to the destructive action of water and temperature changes, which easily wear the images away. Because the Lascaux caves have many entrances, air movement has also damaged the images inside. Although they are not out in the open air, where natural light would have destroyed them long ago, many of the images have deteriorated and are barely recognizable. To prevent further damage, the site was closed to tourists in 1963, 23 years after it was discovered.

(a) Which title best summarizes the main idea of the passage?
   i.   Wild Animals in Art
   ii. Hidden Prehistoric Paintings
   iii. Exploring Caves
   iv. Determining the Age of French Caves

(b) In line 2, the words <u>pays heed to</u> are closest in meaning to _____.
   i.   discovers
   ii. watches
   iii. notices
   iv. buys

(c) According to the passage, which animals appear most often on the cave walls?
   i.   Birds
   ii. Bison
   iii. Horses
   iv. Wild cats

(d) Why was painting inside the Lascaux complex a difficult task?
   i.   It was completely dark inside.
   ii. The caves were full of wild animals.
   iii. Painting materials were hard to find.
   iv. Many painting spaces were difficult to reach.

(e) According to the passage, all of the following have caused damage to the painting except _____.
   i.   temperature changes
   ii. air movement
   iii. water
   iv. light

22. What is the next term in this series: 1, 3/2, 5/4, 7/8, ……?

23. The run rate in the first 10 overs of a 50-over cricket game was 3.20.
    What should be the run rate in the remaining 40 overs to reach a target of 282 runs?

24. A man had his 19th birthday one day after his grandson's 20th birthday.
    Determine the birthdays and ages of the man and his grandson.

25. Write nineteen in such a way that when one is taken out of it, it becomes Twenty.

26. What will be the angle between the hands of a clock when this test ends?