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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MID TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: PHY 1005

Course Name: Game Physics

Program & Sem: II Semester, B.Tech.

Date: 13/May/2022

Time: 1:30 PM – 3:00 PM

Max Marks: 50

Weightage: 25 %

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Comply with University examination rules and procedures

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx 2M= 20M)

1. The _____ colour is represented by (0,0,255):
 - a. Red
 - b. Green
 - c. Blue
 - d. Magenta
2. An accepted way of representing 2D vector is by using (x,y):
 - a. True
 - b. True only in India
 - c. False
 - d. False only in India
3. Center of Mass is found within the body
 - a. True
 - b. Not always true
 - c. False
 - d. Always False
4. The rate of change of an object's position is known as its _____
 - a. acceleration
 - b. displacement
 - c. velocity
 - d. momentum
5. The slope of velocity time graph indicates the _____ of an object
 - a. acceleration
 - b. mass
 - c. weight
 - d. momentum
6. The force experienced by a body is proportional to its _____
 - a. acceleration
 - b. mass
 - c. size
 - d. momentum

7. What is the equivalent of $x += 1$

- a. $x = x - 1$
- b. $x = x + 1$
- c. $x = x * 1$
- d. $x = x / 1$

8. The function `screen.fill()` is used for

- a. Increase velocity
- b. Decrease velocity
- c. fill screen with a colour
- d. fill screen with circles

9. How many times will the loop run if it starts with `while (1)`:

- a. Infinite times
- b. One time
- c. zero times
- d. gives error

10. What is the value of x after 10 loops:

$x = 0$

```
while (x < 10):  
    x = x + 1
```

- a. 10
- b. 1
- c. 0
- d. 11

(C.O.No.1-3) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries FIVE marks.

(3Qx5M= 15M)

11. In the game 'Pacman', identify some of the physics concepts you have learnt. Is it possible for you to add features to make it more interesting? (C.O.No.1) [Comprehension]

12. A balloon has a volume of 1 m^3 at sea level. Will its volume increase or decrease as it goes higher into the atmosphere? What would happen to its volume if the balloon is pulled to 100m depth under the sea and why? (C.O.No.2) [Comprehension]

13. A small rocket in an online game produces a horizontal thrust of 3 N towards the right. It suddenly experiences a tractor beam pulling it upwards with a force of 4 N. What is the direction and magnitude of the resultant force acting on the rocket? How much thrust would you need to give to make it continue to move perfectly horizontally? (C.O.No.2) [Comprehension]

Part C [Problem Solving Questions]

Answer the Question. The question carries FIFTEEN mark.

(1Qx15M= 15M)

14. A bullet of mass 50 gm is moving with a velocity of 100 m/s. It takes 1 sec to stop completely on hitting a target of mass 10 Kg.

a) Calculate the force and acceleration experienced by the target.

b) Correct the code written in order to represent the motion of a circular bullet given below:

```
import pygame

screen = pygame.display.set_mode((700,500))

x = 30

    y = 250

run = True()

while run:

    screen.fill((0,0,0));

    pygame.draw.circle(screen, (100,0,100),(x,y), 10)

    x = x+1

    if( x>650):

        run = False

    pygame.display.update()
```

c) What should be changed in the code to

- i) increase velocity to 10 pixels per loop
- ii) change colour of bullet to red
- iii) change the background colour to white.

(C.O.No. 2-3) [Application]



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Date: 13/May/2022

Time: 1:30 PM – 3:00 PM

Max Marks: 50

Weightage: 25 %

Instructions:

(iii) Read the all questions carefully and answer accordingly.

(iv) Comply with University examination rules and procedures

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx 2M= 20M)

11. The _____ colour is represented by (0,0,255):

- a. Red
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- d. Magenta

12. An accepted way of representing 2D vector is by using (x,y):

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13. Center of Mass is found within the body

- a. True
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14. The rate of change of an object's position is known as its _____

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15. The slope of velocity time graph indicates the _____ of an object

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17. What is the equivalent of $x += 1$

- a. $x = x - 1$
- b. $x = x + 1$
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- d. $x = x / 1$

18. The function `screen.fill()` is used for

- a. Increase velocity
- b. Decrease velocity
- c. fill screen with a colour
- d. fill screen with circles

19. How many times will the loop run if it starts with `while (1)`:

- a. Infinite times
- b. One time
- c. zero times
- d. gives error

20. What is the value of x after 10 loops:

$x = 0$

```
while (x < 10):  
    x = x + 1
```

- a. 10
- b. 1
- c. 0
- d. 11

(C.O.No.1-3) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries FIVE marks.

(3Qx5M= 15M)

11. In the game 'Pacman', identify some of the physics concepts you have learnt. Is it possible for you to add features to make it more interesting? (C.O.No.1) [Comprehension]

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Part C [Problem Solving Questions]

Answer the Question. The question carries FIFTEEN mark.

(1Qx15M= 15M)

14. A bullet of mass 50 gm is moving with a velocity of 100 m/s. It takes 1 sec to stop completely on hitting a target of mass 10 Kg.

a) Calculate the force and acceleration experienced by the target.

b) Correct the code written in order to represent the motion of a circular bullet given below:

```
import pygame

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    pygame.display.update()
```

c) What should be changed in the code to

i) increase velocity to 10 pixels per loop

ii) change colour of bullet to red

iii) change the background colour to white.

(C.O.No. 2-3) [Application]



**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

END TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: PHY 1005

Course Name: Game Physics

Program & Sem: B.Tech. - II Sem

Date: 1st July 2022

Time: 01:00 PM to 04:00 PM

Max Marks: 100

Weightage: 50%

Instructions:

(v) Read the all questions carefully and answer accordingly.

(vi) Follow all the rules laid down by the University regarding examinations

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(15Qx2M= 30M)

21. The _____ colour is represented by (0,0,200): (C.O.No.1) [Knowledge]
 a. Red c. Blue
 b. Green d. Magenta
22. Center of Mass of a cube is found in the (C.O.No.1) [Knowledge]
 a. Outside of the cube c. surface of the cube
 b. center of the cube d. randomly changes
23. Friction varies with change in _____ (C.O.No.2) [Knowledge]
 a. Direction of motion c. normal reaction
 b. Coefficient of friction d. all of the above
24. The slope of velocity time graph indicates the _____ of an object (C.O.No.1) [Knowledge]
 a. acceleration c. velocity
 b. mass d. momentum
25. What is the equivalent of $x += 3$ (C.O.No.2) [Knowledge]
 a. $x = x - 3$ c. $x = x^*3$
 b. $x = x + 3$ d. $x = x/3$
26. The statement `screen.blit(image,(100,250))` is used for (C.O.No.3) [Knowledge]
 a. Updating the display c. changing
 b. Putting image on screen d. change to portrait

27. How many times will the loop run if it starts with 'while True:' (C.O.No.3) [Knowledge]
 a. Infinite times c. zero times
 b. One time d. gives error
28. What is the value of x after 5 loops: (C.O.No.3) [Knowledge]
 $x = 1$
 while (x < 10):
 $x = x + 1$
 $x = 3$
 a. 30 c. 0
 b. 3 d. 11
29. `pygame.draw.circle(.....)` is used to draw a (C.O.No.3) [Knowledge]
 a. Circle c. rectangle
 b. Triangle d. line
30. The condition if $x < 10$ and $x > 5$: is true if (C.O.No.3) [Knowledge]
 a. $x = 3$ c. $x = 13$
 b. $x = 7$ d. $x = 23$
31. An example of numerical integration method is (C.O.No.2) [Knowledge]
 a. Runge-Kutta c. differentiation
 b. List d. division
32. An example of rigid body is (C.O.No.2) [Knowledge]
 a. Water c. cloth
 b. steel chair d. rope
33. Vectors have both direction and (C.O.No.2) [Knowledge]
 a. length c. magnitude
 b. height d. nothing else
34. Vectors may be represented in the form of (C.O.No.2) [Knowledge]
 a. Lines c. co-ordinates
 b. Matrices d. all of the above
35. Gravity may be applied in pygame by changing the velocity (C.O.No.1) [Knowledge]
 a. False c. always false
 b. Never true d. True

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks.

(4Qx10M=40M)

36. An image is blit on a screen using the `pygame.blit(pic,(300,300))` command. How do we change its position and velocity? (C.O.No.2) [Comprehension]
37. With relation to the game 'PUBG' discuss any physics concepts which you studied? What physics concepts can you remove and yet keep it interesting? (C.O.No.1) [Comprehension]
38. Rocket of mass 1000 Kg experiences and upward thrust of 11,000 N. What is the force it experiences? Will the rocket go up or remain on the ground? How will you incorporate it in a game? (C.O.No.3) [Comprehension]
39. Give ideas to make a game like 'Mario' more interesting. Explain any physics concepts you might apply in addition to the concepts in the game? (C.O.No.3) [Comprehension]

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries FIFTEEN marks.

(2Qx15M=30M)

40. Please correct the errors in the code below:

```
import pygame
pygame.init()

screen = pygame.display.set_mode((500,700))
    pygame.display.set_caption(Test)
run = True()
while False:
    screen.fill((255,255,255));
    pygame.display.update
```

What does the code below do?

- a) import pygame
- b) screen = pygame.display.set_mode((720, 480))
- c) pygame.draw.circle(screen, (0, 0, 255), (250, 250), 75)
- d) screen.fill(255,255,255)
- e) pygame.display.update()

(C.O.No. 2-3) [Application]

41. Explain how the following Physics concepts may be applied in a game:

- i) Acceleration
- ii) Friction
- iii) Momentum

(C.O.No. 2-3) [Application]