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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019**

COURSE NAME : VIRTUAL REALITY
COURSE CODE : BIM 30803
PROGRAMME CODE : BIM
EXAMINATION DATE : JUNE/JULY 2019
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

TERBUKA

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

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- Q1** (a) Using XYZ fixed angles method, sketch a new orientation of virtual observer (VO) if the following conditions are given:
 roll = 90° , pitch = -270° , yaw = -180°
 $(t_x, t_y, t_z) = (2, 1, 3)$ (13 marks)

- (b) Calculate the matrix transformation. (10 marks)

- Q2** Analyze the following scenario:

If a VO is oriented in a VE using XYZ Euler angles in the sequence roll, pitch, yaw and translate with the following values roll = 90° , pitch = -270° and yaw = 360° ; $(t_x, t_y, t_z) = (5)$.

- (a) Sketch a new orientation of VO. (12 marks)
- (b) Prove that the coordinate of P' is similar with P if the coordinate $P(1, 0, 1)$ is given. Show your working. (12 marks)

- Q3** In virtual reality application, a 3D cartesian frame of reference within which objects and virtual observer (VO) location is required to construct a virtual environment (VE).

- (a) List **THREE (3)** categories of fundamental privileged informations 3D computer animation. (3 marks)
- (b) A unit cube is offset along the x-axis by 1 unit and z-axis by 2 unit. The cube is then scaled by a factor of 5. Calculate the P' of the scaled cube if $P(0, 1, 1)$ of unit cube is given. (5 marks)
- (c) Consider the activities happened in **Figure Q3** using XYZ Euler angles method. First, roll the object about the z-axis through an angle of 90° rotations, second, 90° pitch rotations about the x-axis and the last rotation consist of a 90° yaw rotation about the y-axis. Calculate and sketch the final location of the point P' in the object coordinate system (OCS). (18 marks)

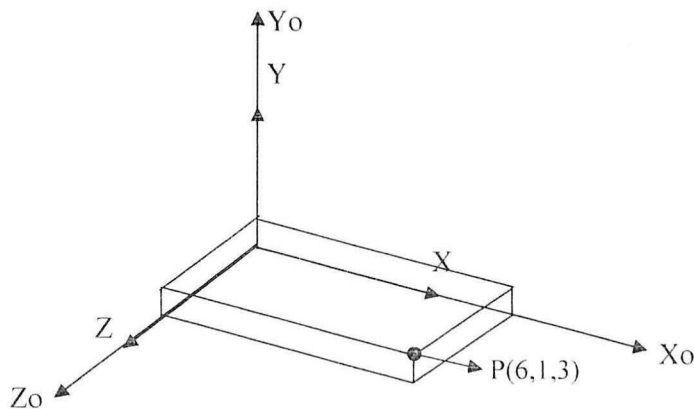
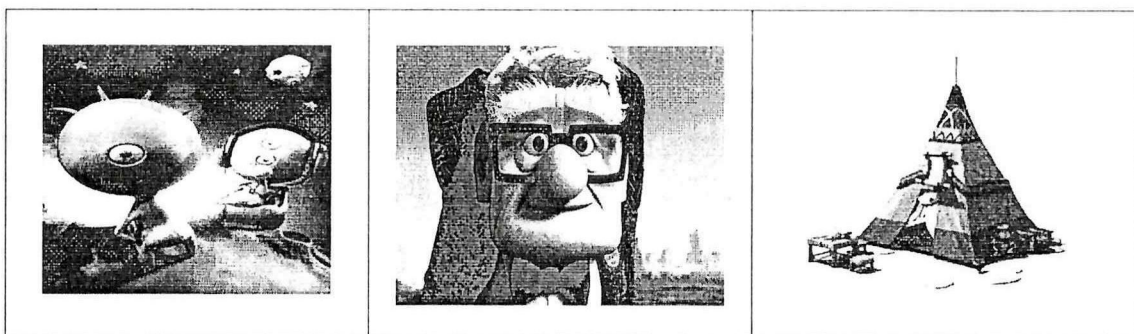


Figure Q3

- Q4 (a) Describe weight in 3D modelling principle and support your description with an example. (4 marks)
- (b) Give **THREE (3)** characteristics of the given objects which represent their character with example of which 3D shape it is made of. (6 marks)



- Q5 (a) Explain crowd simulation and give **TWO (2)** reasons why it is very important especially in virtual cinematography with an example of a movie which uses crowd simulation. (8 marks)
- (b) Explain **TWO (2)** types of haptic interface. (2 marks)
- (c) Name **TWO (2)** types of tracking methods in mixed realities application. Identify **ONE (1)** point that differentiates them based on its functionality. (3 marks)

- END OF QUESTION -