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Beyond A Graduate

CINEC CAMPUS
Faculty of Maritime Sciences
Department of Navigation
EDUCATION & TRAINING COURSE : ENGINEERING *Cadet Training Course – Foundation*
COURSE CODE : BATCH 025

MID REPEAT EXAMINATION – QUESTION PAPER
APPLIED MECHANICS

- *Answer any 04 questions only*
- *Total Marks – 100*
- *g = 9.8 ms⁻²*

Date: 03.09.2022   *Pass mark 50%*   *Time allocated: 03 Hours*

1)

i.   Define **velocity**, **Speed** and **acceleration**   (3× 3= 9 marks)

ii. A cyclist leaves home O and rides along a straight road with a constant acceleration. After 10 seconds, he has reached point A with a speed 15m/s and he maintains this speed for a further 20 seconds until he reaches B before retarding (decelerating) uniformly to rest at C. The whole journey takes 45 seconds. Sketch the **velocity- time graph** for the journey and find;

(7 marks)

i)   His acceleration from O to A.

ii) His retardation (deceleration) from B to C.

iii) The total distance traveled from O to C.

(9 marks)

2)

i.   Man through a ball at **u** ms⁻¹ at angle **θ** to horizontal .(gravitational acceleration as **g ms⁻²**).show that horizontal range of projectile (R) is

$$R = \frac{u^2 \sin 2\theta}{g}$$

(Show your work out)   (5 marks)

ii. A stone is thrown upward from the top of a building at an angle of 30^0 to the horizontal and with an initial speed of 20.0 m/s. The point of release is 45.0 m above the ground.

(a) How long does it take for the stone to hit the ground?

(b) Find the stone's speed at impact.
(c) Find the horizontal range of the stone.   (20 marks)

3)

i. State Newton's laws of motion   (3 ×4 =12 marks)

ii. A light string passes over a smooth pulley, and carries particles of masses 6 kg and 11 kg at each end.

   a) Mark all the force acting on the system   (5 marks)

   If the system moves freely find;

   b) find the acceleration of masses and tension of the string   (8 marks)

4)

i. Draw a graph to illustrate the variation of frictional force (F) with applied force. Mention limiting frictional force, Static region and Kinetic region on the graph.   (7 marks)

ii. A cord running over a pulley connects two objects. The coefficient of static friction between the object and the table is 0.3, The coefficient of dynamic friction is 0.25. If m_1 = 4.0 kg and m_2 = 8 kg Find,

   a. Limiting frictional force.
   b. Acceleration of the system.
   c. Tension of the string.
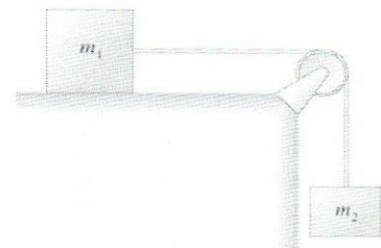
$(6 \times 3 = 18$ marks)

5)

i. What is the impulse of a force of 10 N acting on a ball for 2 seconds?   (6 marks)

ii. A freight train is being assembled in a switching yard, and Figure shows two boxcars. Car 1 has a mass of $m_1 = 65 \times 10^3$ kg and moves at a velocity of $v_{01} = +0.80$ m/s. Car 2, with a mass of $m_2 = 92 \times 10^3$ kg and a velocity of $v_{02} = +1.3$ m/s, overtakes car 1 and couples to it. Neglecting friction, find the common velocity v_f of the cars after they become coupled.

(a) Before   (b) After
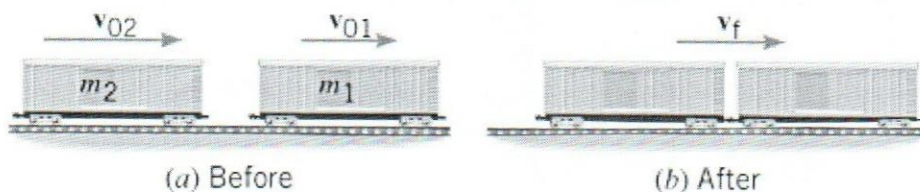
                                                                         (8 marks)

iii. A 5 Kg Cart is pushed by a 30 N force against friction for a distance of 10m in 5 seconds. Determine the Power needed to move the cart.   (4 marks)

iv. How much potential energy is lost by a 5Kg object to kinetic energy due a decrease in height of 4.5 m   (4 marks)

v. How fast should a man of mass 50 kg run, so that his kinetic energy is 625 J   (4 marks)

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Department of Marine Engineering
EDUCATION & TRAINING COURSE: ENGINEER OFFICER CADET FOUNDATION TRAINING COURSE
COURSE CODE:

FINAL EXAMINATION QUESTION PAPER
Introduction to the Shipping

- *This question paper consists of Five questions.*
- *Answer All Questions*
  Date: 2022.09.03   Pass mark 50%   Time allocated: 03 Hrs

1.   Make a detailed sketch of a merchant ship and mark following parts.   (20 marks)
        Accommodation, stbd side, port side, anchor, forecastle, navigation light, main mast, keel,
        double bottom tank, bow thruster, navigation bridge, fore peak tank, aft peak tank,
        funnel, propeller, rudder, draft, length overall, beam and air draft.

2. (a) Give 10 kind of safety gears widely used on board.   (10marks)

   (b) Explain 5 of above safety gears.   (10marks)

3. (a) Make a list of different types of ships widely used in shipping industry.   (10 marks)

   (b) Briefly describe 5 of them.   (10 marks)

4. (a) What is meant by LSA and FFA (4marks)

      (b) List 5 types of items fall into each of above category.   (10 marks)

      (c) Sketch and describe any type of portable fire extinguisher.   (06 marks)

5. (a) Make a list of 10 navigation equipment available on bridge for safe navigation.

                                                                                                      (10 marks)

   (b) Write brief notes on 5 of above items.   (10 marks)

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COURSE CODE: ED 0340

1ST SEMESTER REPEAT EXAMINATION QUESTION PAPER
Mathematics

- *Answer <u>Any 06</u> Questions*
  Date: 2022.09.05   *Pass mark 50%*   *Time allocated: 03 Hrs*

Question 1   (100 marks)

1.1 Sketch the curve $y = x^2 - 4$.   (25marks)

1.2 Write down the co-ordinates of the points where the curve crosses the x axis.   (25marks)

1.3 Differentiate $y = x^2 - 4$ with respect to x.   (25marks)

1.4 Find the Gradients of the curve where the points it crosses the x axis.   (25marks)

Question 2   (100 marks)

2.1 Differentiate $f(x) = \frac{(x^2+1)(x-5)}{x}$ (50 marks)

2.2 Given that $y = \sqrt{x} - \frac{8}{x^2}$, find

    (a) $\frac{dy}{dx}$ (25 marks)
    (b) The gradient of the curve at the point $\left(4, 1\frac{1}{2}\right)$ (25 marks)

Question 3   (100 marks)

3.1 Differentiate the curve $y = 2x^2 + 5x - 12$ with respect to x.   (25marks)

3.2 Find the Gradient of the curve at the point (1, -5).   (25marks)

3.3 Find the equation of the Tangent of the curve at the point $(1, -5)$.   (25marks)

1

3.4 Find the equation of the Normal of the curve at the point (1, -5).   (25marks)

Question 4   **(100 marks)**

4.1 Prove the identity $\cos^2 x - \sin^2 x = 2\cos^2 x - 1$ (50 marks)

4.2 Prove the identity $\dfrac{\cos x}{1-\sin x} - \dfrac{1}{\cos x} = \tan x$ (50 marks)

Question 5   **(100 marks)**

   Factorize the given expressions.

   5.1 $x^2 + 7x + 12$ (25 marks)

   5.2 $x^2 - 20x + 100$ (25 marks)

   5.3 $x^2 - 49$ (25 marks)

   5.4 $6x^2 + x - 12$ (25 marks)

Question 6   **(100 marks)**

Standard equations of the arithmatic progression $T_n = a + (n-1)d$,

$$S_n = \frac{n\{2a + (n-1)d)}{2}$$

6.1 How many terms are there in the sequence   (50 marks)
    11, 15, 19,….., 643

6.2 Find the sum of the first 100 terms of the progression $1,\ 1\frac{1}{4},\ 1\frac{1}{2},\ 1\frac{3}{4}$,…….   (50 marks)

Question 7   **(100 marks)**

7.1 Solve $x^2 - 40x - 6000 = 0$ (50 marks)

7.2 Use the quadratic formula to solve $3x^2 - 6x + 2 = 0$ (50 marks)

Question 8   **(100 marks)**

Standard equations of the geometric progression $T_n = ar^{n-1}$, $S_n = \dfrac{a(r^n-1)}{(r-1)}$

8.1 Find the 7th term in the geometric sequence 8, 24, 72, 216,...   (50 marks)

8.2 The first 3 terms of an infinite geometric progression are 16, 12 and 9

   (a) Write down the common ratio.   (25 marks)

   (b) Find the sum of the terms of the progression.   (25 marks)

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FINAL EXAMINATION QUESTION PAPER
Engineering Drawing

- Answer *All Questions*

Date: 22.09.22   Pass mark 50%   Time allocated: 03 Hrs

Marking System

(1) Q 1
    a. Front elevation from A   35 Marks
    b. End elevation from B   25 Marks
    c. Plan view   25 Marks
(2) Optimizing of space   05 Marks
(3) Titles and Lettering   05 Marks
(4) Boundaries, Lines, and overall neatness   05 Marks

Q1.   Using *first angle* orthographic projection, draw the cast iron block as per the given detail in full scale. Include all hidden details and relevant center lines.
Following views are required;

      I.   Front elevation from A
     II.   End elevation from B
   III.   Plan view

assume any missing dimensions

Q1

4 HOLES,
DIA 10

φ 70
φ 50
60
60
WEB 10
10
10
5
35
15
30
50
80
60
90
120
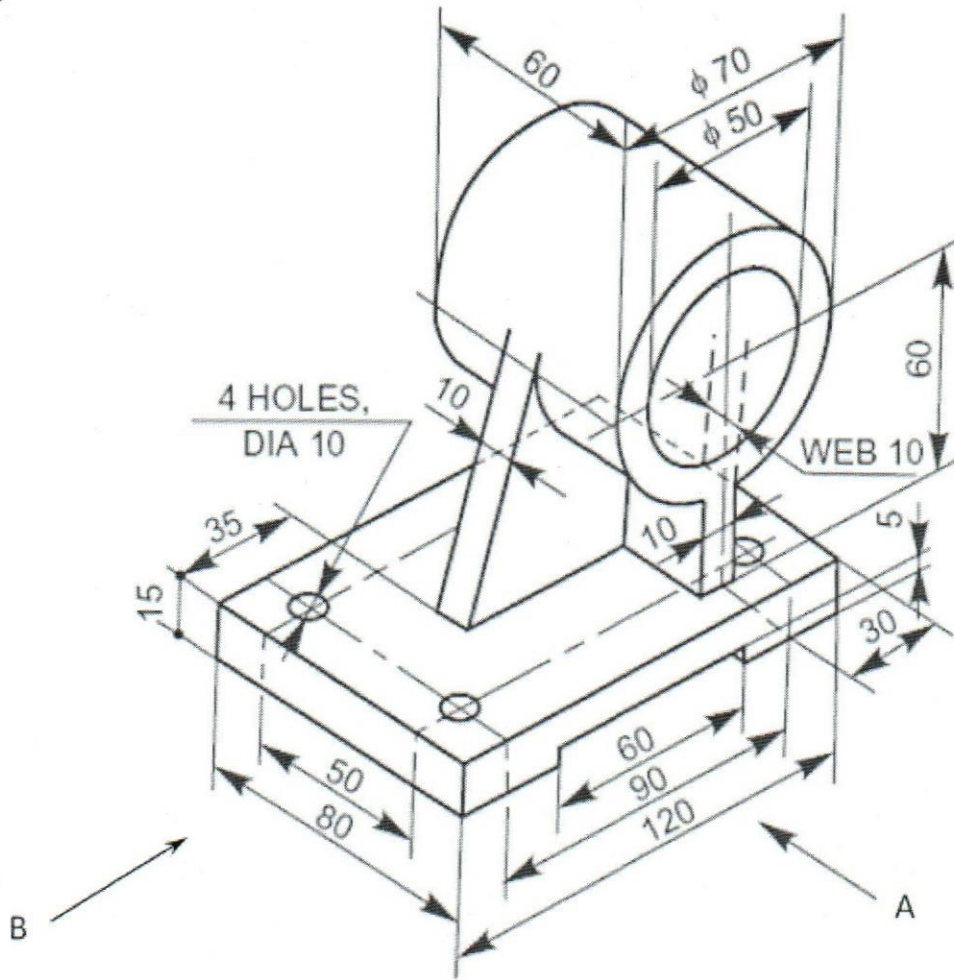
All dimensions are in millimeters

B

A