Register Number:……..

KUMARAGURU
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M.E / M.TECH/MCA DEGREE EXAMINATIONS: NOV/ DEC 2024

(Regulation 2024)

First Semester

DEFENCE TECHNOLOGY

24DTT502: Systems and Warfare Platforms

COURSE OUTCOMES

CO1: Understand types of warfare platform used for Army, Air and Marine and their design fundamentals

CO2: Understand the weapon systems like guns, ordnance, missiles projectiles, mines/ countermines, lasers, undersea weapons, air-launched weapons, anti-aircraft, anti-ship and anti-submarine.

Time: Three Hours **Maximum Marks: 100**

PART A (4*20 = 80 Marks)

1.	a)	(i) Name the first two indigenous aircraft carriers made in our country. (ii) What is 'STOBAR'?	2	CO1	[K_1]
	b)	A Ship of 6000 ton is composed of masses 300, 1200, 2000 ton at distances 60, 35 & 11 m aft of midships and masses 1000, 1000 and 500 tons at 15, 30 and 50 m forward of midships. Calculate C of G of the ship from midships.	3	CO2	[K_3]
	c)	Match the following:-	4	CO1	[K_2]
	d)	'Height of the Metacentre above Centre of Buoyancy is found by dividing Moment of Area of the waterplane about its centreline by the volume of Displacement.' – Examine this statement and establish relationship with the help of a neat illustration.	5	CO2	[K_3]
	e)	Justify in your own words the action of the Romanian Navy in acquiring two Royal Navy Frigates, F-95 & F-98 after its useful life with Royal Navy in the light of Life Cycle of Military products.	6	CO1	[K_2]

(a) INS Vikramaditya	1 - L P D
(b) INS Jalashwa	2 - Destroyer
(c) INS Kolkatta	3 - Frigate
(d) INS Shivalik	4 - Submarine
	5 - Aircraft Carrier

2.	a)	What does atmospheric 'Lapse Rate' in International Standard Atmosphere represent and what is its value?	2	CO1	[K_2]
	b)	What is a Bulbous Bow? Explain as to how does it help in reducing ship resistance?	3	CO2	[K_2]
	c)	'The ratio of different forces in model and full scale should be constant'. Examine this statement and explain which are these forces and what are the different ratios for Kinetic (Dynamic) Similarity in ship-model testing?	4	CO1	[K_3]
	d)	Distinguish between an aeromodelling aircraft, a Drone and an UAV.	5	CO2	[K_3]
	e)	'Any conventional ship which is undamaged will not get unstable when inclined about a transverse axis'. Evaluate this statement critically and provide justification for your assessment.	6	CO2	[K_3]
3.	a)	Why should we not fight Electrical fire and Oil Fire using water? What is the correct extinguishing agent for these fires?	2	CO1	[K_2]
	b)	Explain the three pronged approach of PREVENT (in design), MINIMISE (in service) and RESTORE (after damage) mean with regard to Damage Control in ships?	3	CO1	[K_2]
	c)	Distinguish and contrast between a mine and a torpedo? List the salient features of 'Varunastra' Torpedo.	4	CO2	[K_2]
	d)	Why do we call an Aircraft a 6 DOF system? Examine with respect to the different axes of rotation, corresponding rotational movement, corresponding primary control surface and type of stability with a neat diagram.	5	CO2	[K_3]
	e)	What is Cavitation in propellers? In your opinion Is it beneficial or harmful? Discuss	6	CO2	[K_3]
4.	a)	Define the following:- (a) Free Stream Airflow (b) Total Reaction (c) Aspect Ratio	2	CO1	[K_2]

(d) Mean Line or Camber line

b)	A ship displaces 12240 m^3 of Sea Water at a particular draught. (a) Calculate the displacement of the ship? (b) How many tonnes of Cargo would have to be discharged for the vessel to float at the same draught in Fresh Water?	3	CO2	[K_3]
c)	Name all the primary control surfaces of an aircraft and atleast two secondary control surfaces along with their purpose.	4	CO2	[K_3]
d)	What are the different types Electronic Countermeasures? Explain at least two of the types	5	CO2	[K_2]
e)	What is the meaning of Ionizing Radiation? Explain about Alpha, Beta, Gama particles and Neutron.	6	CO2	[K_3]

Answer any ONE Question
PART B (1*20 = 20 Marks)

5.	a)	Expand the following acronyms:- - N V G - G P S - S S M - F L I R	2	CO1	[K_2]
	b)	Compare and contrast between the following airspeeds:- TAS (True Airspeed), IAS (Indicated Airspeed), CAS (Calibrated Airspeed) and EAS (Equivalent Airspeed)	4	CO2	[K_3]
	c)	Explain the concept of Symmetry and Dissymmetry of Rotor Thrust as experienced in Helicopters.	4	CO1	[K_3]
	d)	Distinguish between a Normal (Coordinated) Turn, Slipping Turn and Skidding Turn with respect to the forces acting on an aircraft with a neat line diagram.	5	CO2	[K_4]
	e)	What are the the different types of Gas Turbine Engines used in Aviation? How do they differ in terms of producing thrust /power?	5	CO2	[K_4]

OR

6.	a)	Define the term ‘critical Mach number’?	2	CO1	[K_2]
	b)	What are the categories of Flight Testing and briefly explain their significance.	3	CO2	[K_3]

c)	Explain the concept of Flapping to equality in Helicopters.	4	CO1	[K_3]
d)	What are the two major group of Aircraft Instruments and explain the function of one instrument from each group.	5	CO2	[K_4]
e)	Explain the following:- - Aircraft Stall - Advance Angle in Helicopters - Glass Cockpit	6	CO2	[K_3]

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