KUMARAGURU
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GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)

2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.

3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.

4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.

5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E DEGREE EXAMINATIONS: JUNE 2016

(Regulation 2015)

Second Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U15MET204**:** Thermal Engineering and Fluid Mechanics

COURSE OUTCOMES

CO1: Demonstrate understanding of basic concepts of thermodynamics and power plants

CO2: Explain the working of prime movers.

CO3: Understand the working of air conditioning systems.

CO4: Solve problems in fluid properties

CO5: Solve problems in flow dynamics

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Wind turbine blades are fitted on   CO1   [K_1]

   a) Hubs   b) Tower

   c) Nozzle   d) Generator

2. Which of the following are non conventional power generation methods?   CO1   [K$_2$]

   1.Solar power 2. Wind power 3.Nucler power 4. Liquid fuel power 5. Solid fuel power

   a)   3,4,2   b)   1,2

   c)   1,4,5   d)   4,5

3. The excess pressure in a droplet of 0.002 m dia fluid with surface tension of 0.01 N/m is   CO4   [K$_2$]

   a)   10   b)   20

   c) 4π d) 0.0004π

4. In which sequence of process, a refrigerant undergo in ideal vapour compression refrigeration cycle ?   CO3   [K$_2$]

   1. Compression   2. Heat rejection   3.   Throttling   4. Heat absorption

   a)   1-2-3-4   b)   2-3-1-4

   c)   4-2-3-1   d)   3-2-4-1

5. The power consumed by the vapour absorption refrigeration system is ………… the vapour compression refrigeration system   COL   [K$_L$]

   a)   Less than   b)   Equal to

   c)   Greater than   d)   Less than or equal to

6. The correct sequence of processes in internal combustion engine is   CO2   [K$_2$]

   1.Compression   2. Expansion   3. Suction   4. Exhaust

   a)   4-1-2-3   b)   4-3-2-1

   c)   1-3-2-4   d)   3-1-2-4

7. In a steady flow along a stream line at a location in the flow, the velocity head is 6 m, the pressure head is 3 m, the potential head is 4 m. The height of hydraulic gradient line at this location will be   CO5   [K$_2$]

   a)   13m   b)   9m

   c)   10m   d)   7m

8. Assertion (A): Thermal efficiency of the CI engine is higher than SI engine   CO2   [K$_2$]

   Reason (R): The compression ratio in diesel engines is of the order of 14-20

   a)   Both A and R are individually true and R is correct explanation of A   b)   Both A and R are individually true and R is not the correct explanation of A

   c)   A is true but R is false   d)   A is false but R is true

9. In a laminar flow through pipe the average velocity is .... of the maximum velocity   CO5 $[K_1]$

    a)   Twice   b)   Thrice

    c)   Square   d)   One half

10. Match the list I with list II   CO4 $[K_2]$

List I	**List II**
A. dynamic viscosity	i. surface tension
B. capillary rise	ii. momentum transfer
C. kinematic viscosity	iii. liquid
D. free surface	iv. shear stress

	A	B	C	D
a)	iv	i	iii	ii
b)	iii	ii	i	iv
c)	ii	i	iv	iii
d)	iv	iii	ii	i

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Outline the importance of boilers in power generation   CO1 $[K_3]$

12. List the merits and demerits of nuclear power plants   CO1 $[K_2]$

13. Distinguish between impulse and reaction turbines   CO2 $[K_3]$

14. Draw theoretical p-v diagram of four stroke petrol engine and name the processes   CO2 $[K_2]$

15. Compare centrifugal and axial flow compressors   CO3 $[K_3]$

16. Define relative humidity   CO3 $[K_1]$

17. An oil with specific gravity of 0.85 flows in a pipe of 100 mm dia., the flow rate being 0.5 l/s. The kinematic viscosity at this condition is 1.8×10^{-5} m^2/s. Determine the type of flow   CO4 $[K_3]$

18. Discuss the various flow lines   CO4 $[K_2]$

19. What is TEL and HGL?   CO5 $[K_2]$

20. Compare pipes in series and parallel   CO5 $[K_3]$

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21.	i) A square plate of size 1x1 m weighing 350 N slides down an inclined plane with a uniform velocity of 1.5 m/s . The inclined plane is laid on a slope of 5 vertical to 12 horizontal and has an oil film thickness of 1 mm. calculate dynamic viscosity of oil	(7)	CO4 [K$_3$]
	ii) Water is flowing through a pipe having diameters 25 cm and 15 cm at sections 1 and 2 respectively. The rate of flow through the pipe is 40 lt/s. The section 1 is 8 m above datum and section 2 is 6 m above datum. If the pressure at section 1 is 40 N/cm^2 find the intensity of pressure at section 2	(7)	
22.	Demonstrate the working of 4 Stroke diesel engine with neat sketch. Also state the applications in detail		CO2 [K$_2$]
23.	Explain the working of coal power plant with its various accessories. Also state the merits and demerits		CO1 [K$_2$]
24.	State the assumptions and derive bernoulli's equation. Also list the applications		CO4 [K$_2$]
25.	i)Explain the working of vapour compression refrigeration system	(7)	CO3 [K$_2$]
	ii)Discuss summer air conditioning system in detail	(7)	
26.	Explain the working principle of centrifugal pump with sketch		CO5 [K$_2$]
27.	The difference in water surface levels in two tanks , which are connected by three pipes in series of lengths 300m, 170m and 210m and of diameters 300mm, 200 mm and 400mm respectively is 12 m. Determine the rate of flow of water if coefficient of friction are 0.005, 0.0052 and 0.0048 respectively by considering minor losses also		CO5 [K$_3$]

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