



Registration No:

--	--	--	--	--	--	--	--	--	--

Total Number of Pages : 2

B.TECH

4th Semester Regular Examination-April-May 2019
BCEPC 4030 – Fluid Mechanics & Hydraulic Machines
(Regulations 2017) CIVIL ENGG.

Time : 3 Hours

Maximum : 100 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) 10 x 2=20 Mark**Q.1. Answer ALL Questions.**

- a The property of fluid by virtue of which it offers resistance to shear is called [CO1] [PO1]
(a) surface tension (b) adhesion (c) cohesion (d) viscosity
- b Rain drops are spherical because of [CO] [PO2]
(a) viscosity (b) air resistance (c) surface tension forces (d) atmospheric pressure
- c Manometer is used to measure [CO2] [PO1]
(a) pressure in pipes, channels (b) atmospheric pressure (c) very low pressure
(d) difference of pressure between two points
- d A balloon lifting in air follows the following principle [CO2] [PO2]
(a) law of gravitation (b) Archimedes principle (c) principle of buoyancy
(d) all of the above
- e For pipes, turbulent flow occurs when Reynolds number is [CO3] [PO1]
(a) less than 2000 (b) between 2000 and 4000 (c) more than 4000
(d) less than 4000
- f An ideal flow of any fluid must fulfill the following [CO3] [PO1]
(a) Newton's law of motion (b) Newton's law of viscosity (c) Pascal' law
(d) Continuity equation
- g According to Bernoulli's equation for steady ideal fluid flow [CO4] [PO1]
(a) principle of conservation of mass holds (b) velocity and pressure are inversely
proportional (c) total energy is constant throughout (d) the energy is constant along a
stream-line but may vary across streamlines
- h Which of the following instruments is used to measure flow on the application of [CO4] [PO2]
Bernoulli's theorem
(a) Venturimeter (b) Orifice plate (c) pitot tube (d) all of the above.
- i Pelton turbine is [CO5] [PO1]
(a) Tangential flow (b) Radial flow (c) Axial flow (d) Mixed flow
- j The main function of centrifugal pumps are to _____ [CO5] [PO1]
a) Transfer speed b) Transfer pressure c) Transfer temperature d) Transfer energy

PART – B: (Short Answer Questions) 10x2=20 Marks**Q.2. Answer ALL questions**

- a Define Vapour pressure and Surface tension? [CO1] [PO1]
- b Define Kinematic Viscosity and mention its significance [CO1] [PO1]
- c Write about Pascal's law? [CO2] [PO2]
- d Define metacentric height? [CO2] [PO1]
- e What is the difference between laminar flow and turbulent flow? [CO3] [PO2]
- f Distinguish rotational flow and irrotational flow? [CO3] [PO2]
- g Write Bernoulli's equation for flow along a stream line? [CO4] [PO2]
- h What is minor loss in pipe flow? [CO4] [PO2]
- i Classify turbines based on hydraulic action of water? [CO5] [PO2]
- j Which has high efficiency centrifugal pump or reciprocating pump? [CO5] [PO2]

**PART – C: (Long Answer Questions) 4x15=60 Marks****Q.3 Answer ALL questions**

- | | | | |
|----|--|---------|-------------|
| a. | State and prove Pascal's law? | 7 Marks | [CO1] [PO2] |
| b. | If 5 m ³ of certain oil weighs 45 kN calculate the specific weight, specific gravity and mass density of the oil. | 8 Marks | [CO1] [PO2] |

OR

- | | | | |
|----|---|---------|-------------|
| a. | A 15 cm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 15.10cm. Both cylinders are 25 cm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. If a torque of 12 Nm is required to rotate the inner cylinder at 100 rpm. Determine the viscosity of the fluid? | 7 Marks | [CO2] [PO2] |
| b. | Explain surface tension & capillarity with neat diagram and an expression. | 8 Marks | [CO2] [PO2] |

Q.4

- | | | | |
|----|---|----------|-------------|
| a. | Distinguish between (i) steady and unsteady flow (ii) uniform and non-uniform flow (iii) irrotational and rotational flow.(iv) compressible and incompressible flow (v) free vortex flow and forced vortex flow | 15 Marks | [CO3] [PO1] |
|----|---|----------|-------------|

OR

- | | | | |
|----|--|----------|-------------|
| c. | Derive the continuity equation from fundamentals? | 07 Marks | [CO3] [PO2] |
| d. | The diameter of a pipe at the sections 1 and 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if the velocity of flowing through the pipe at section 1 is 5 m/sec. Determine also the velocity at section2. | 08 Marks | [CO3] [PO1] |

Q.5

- | | | | |
|----|--|----------|-------------|
| a. | Derive Bernoulli's equation from Euler's equation of motion? | 15 Marks | [CO4] [PO2] |
|----|--|----------|-------------|

OR

- | | | | |
|----|--|---------|-------------|
| c. | Explain hydraulic gradient line and total energy line? | 8 Marks | [CO4] [PO1] |
| d. | Explain pipes in series and pipes in parallel? | 7 Marks | [CO4] [PO2] |

Q.6

- | | | | |
|----|---|----------|-------------|
| a. | Apelton wheel turbine is to be designed for the following specifications. Shaft power = 11772 kW, Head= 380 mts, Speed= 750 rpm, overall efficiency = 86%, jet diameter is not to exceed one-sixth of the wheel diameter. Determine i) the wheel diameter (ii) the number of jets required and (iii) Diameter of the jet. Take $C_v = 0.98$ and $\phi = 0.45$. | 15 Marks | [CO5] [PO2] |
|----|---|----------|-------------|

OR

- | | | | |
|----|---|----------|-------------|
| c. | Explain working of Reciprocating pump with neat sketch? | 15 Marks | [CO6] [PO2] |
|----|---|----------|-------------|

==0==