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BTECH
(SEM I) THEORY EXAMINATION 2021-22
FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS

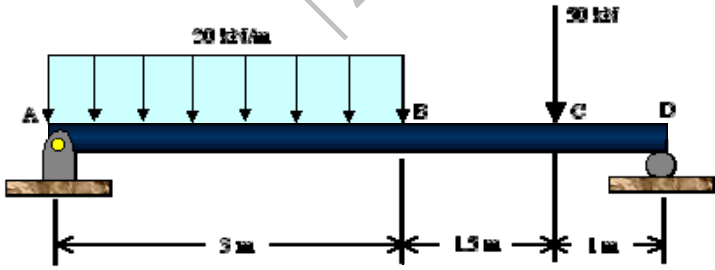
Time: 3 Hours**Total Marks: 100****Note: 1. Attempt all Sections. If require any missing data; then choose suitably.****SECTION A****1. Attempt all questions in brief.****2 x 10 = 20**

| Q. no. | Question | Marks | CO |
|--------|--|-------|----|
| a. | State Hooke's law. | 2 | 1 |
| b. | Discuss about superposition theorem. | 2 | 1 |
| c. | Discuss the terms used in IC engine - TDC, BDC, Stroke and Bore. | 2 | 2 |
| d. | Write the any six components of IC Engine. | 2 | 2 |
| e. | Discuss the equation of continuity. | 2 | 3 |
| f. | Write any four properties of fluid. | 2 | 3 |
| g. | Differentiate between precision and accuracy. | 2 | 4 |
| h. | What is the absolute pressure experienced by a pressure sensor, if the atmospheric pressure of a fluid is 2 atm, gauge pressure is 5 atm and differential pressure is 3 atm? | 2 | 4 |
| i. | Differentiate active and passive transducers. | 2 | 5 |
| j. | What is the function of an accumulator? | 2 | 5 |

SECTION B**2. Attempt any three of the following:****10 x 3 = 30**

| Q. no. | Question | Marks | CO |
|--------|--|-------|----|
| a. | Draw S.F.D. and B.M.D. for simply supported beam carrying a uniformly distributed load W (KN/m) throughout its length L (m). What is the maximum bending moment? | 10 | 1 |
| b. | Explain the working of four stroke petrol engine with diagram. | 10 | 2 |
| c. | Explain the working and construction details of reciprocating pump. | 10 | 3 |
| d. | Explain the construction and working of optical pyrometer. | 10 | 4 |
| e. | Discuss the various key elements of a mechatronics system and write any four-mechatronics system. | 10 | 5 |

SECTION C**3. Attempt any one part of the following:****10 x 1 = 10**

| Q. no. | Question | Marks | CO |
|--------|--|-------|----|
| a. | Draw S.F.D. & B.M.D. for fig. shown below-  | 10 | 1 |
| b. | Develop the relationship between E (Young's modulus), C (Shear modulus), K (Bulk modulus) and μ (Poisson ratio). | 10 | 1 |



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4. Attempt any *one* part of the following: 10 x 1 = 10

| Q. no. | Question | Marks | CO |
|--------|---|-------|----|
| a. | Compare the following- (i) SI Engine and CI Engine (ii) 4-stroke Engine and 2-stroke Engine | 10 | 2 |
| b. | Explain the working of vapour compression refrigeration system by T-S diagram with related block diagram. | 10 | 2 |

5. Attempt any *one* part of the following: 10 x 1 = 10

| Q. no. | Question | Marks | CO |
|--------|---|-------|----|
| a. | What are the parts of venture meter? Derive a formula to measure the rate of flow of a liquid through venturi meter. $Q = \frac{a_1 a_2}{\sqrt{a_1^2 - a_2^2}} \sqrt{2gh}$ | 10 | 3 |
| b. | What is Turbine? Explain construction details of Pelton Turbine with diagram. | 10 | 3 |

6. Attempt any *one* part of the following: 10 x 1 = 10

| Q. no. | Question | Marks | CO |
|--------|---|-------|----|
| a. | Explain in detail with suitable diagram – (i) Limit and their types (ii) Fits and their types. | 10 | 4 |
| b. | Define pressure. Write the classification of pressure measurement instruments. Explain the working of bourdon tube pressure gauge with neat sketch. | 10 | 4 |

7. Attempt any *one* part of the following: 10 x 1 = 10

| Q. no. | Question | Marks | CO |
|--------|--|-------|----|
| a. | What is Sensor? Explain classification of sensors based on various Inputs and Outputs. | 10 | 5 |
| b. | Explain different types of “Mechanical Actuation system” based on power inputs. | 10 | 5 |