

Question Paper 2010

Mechanical Engineering (Paper II)

1. (a) With the help of figure, explain the working of Babcock and Wilcox boiler. (15)
(b) List out the differences between : (15)
 - (i) Two stroke and Four stroke IC engines
 - (ii) Petrol and Diesel engines
2. (a) Explain different properties of moulding sand. (10)
(b) With the help of figure explain different types of gas flames produced in oxy-acetylene welding process. (5)
(c) With the help of neat figure explain the different nomenclature of twisted drill bit used in drilling machine. (15)
3. (a) What is indexing in milling machine ? Explain the procedure used in compound indexing. (10)
(b) Mention at, least five differences between shaper and slotting machines. (10)
(c) With the help of figure explain centerless grinding process. (10)
4. (a) Derive the continuity equation in differential form. (10)
(b) Calculate the maximum allowable discharge of water through a venturimeter throat 5 cm, fitted in a 10 cm diameter line with its inlet at an open channel.
Assume $C_d = 0.95$. (10)
(c) Explain the performance of centrifugal pumps. (10)
5. (a) A steel bar of rectangular section 50 mm × 30 mm and length 1.5 m is subjected to a gradually applied load of 150 kN. Find the strain energy stored in the bar. If the elastic limit of the material of the bar is 150 N/mm², proceed to determine the proof resilience and modulus of resilience.
Take $E = 2 \times 10^5$ N/mm². (7)
(b) A timber beam of rectangular section is to support a load of 20 kN uniformly distributed over a span of 4 metres. If the depth of the section is to be twice the breadth and the stress in the timber is not to exceed 7 MPa, find the dimensions of the cross-section. (8)
(c) Derive the torsion equation for a shaft subjected to pure torsion. (15)
6. (a) Explain: (15)
 - (i) Watt governor
 - (ii) Porter governor
(b) Explain about helical and bevel gears with applications. (10)
(c) Explain the Ackermann steering gear mechanism. (5)