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C09–EE–406/C09–CHST–406

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2018

DEEE—FOURTH SEMESTER EXAMINATION

GENERAL MECHANICAL ENGINEERING

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define shear modulus and state its SI units. 2+1=3

2. Draw stress-strain diagram for mild steel and name the salient points. 3

3. Write the formulae for polar moment of inertia for solid shaft and hollow shaft. 1½+1½=3

4. A solid shaft is required to transmit a torque of 35820 N-m. The shear stress in the shaft must not exceed 60 N/mm^2. Calculate the size of the shaft. 3

5. List the operations involved in operating an IC engine. 3

6. Write any three advantages of fire-tube boiler over water-tube boiler. 3

7. Draw a simple sketch of IC engine and label its parts. 3

8. State the function of *(a)* spark plug and *(b)* fuel injection pump. 1½+1½=3

9. How are the impellers arranged to produce high head and to deliver high discharge in centrifugal pump? 3

10. State the functions of a lubricant.

PART—B

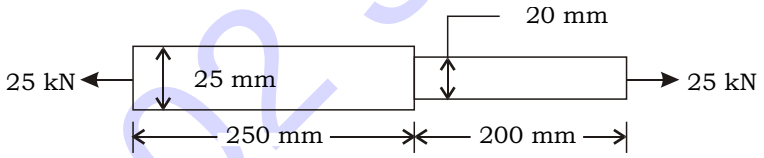
10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. A steel bar is subjected to a tensile force as shown in the figure below. Determine the total elongation of the bar and stress in each section. Take E 2 10^5 N / mm^2 : 10



12. The following results are obtained from a tensile test on a MS specimen :

(i)	Diameter of the specimen	=	20 mm
(ii)	Gauge length	=	100 mm
(iii)	Extension at a load of 80 kN	=	0·125 mm
(iv)	Load at yield point	=	110 kN
(v)	Maximum load	=	185 kN
(vi)	Final elongation	=	30 mm
(vii)	Diameter of neck	=	12·6 mm

Calculate *(a)* Young's modulus, *(b)* stress at yield point, *(c)* the ultimate tensile stress, *(d)* the percentage elongation and *(e)* the percentage reduction in area. 2×5=10

13. A solid steel shaft 100 mm diameter transmits power at 150 r.p.m. If the maximum shear stress induced in it is $25\,N/mm^2$, calculate *(a)* the power transmitted in kW and *(b)* the value of shear stress at a radial distance of 30 mm from its centre. 5+5=10

14. Explain with the help of a line sketch, the working principle of a four-stroke petrol engine. 10

15. Describe the function of economizer with a neat sketch. 10

16. Explain the working of Parson's reaction turbine with a neat sketch. 10

17. Explain the working of Kaplan turbine with a neat sketch. 10

18. What is priming in the centrifugal pump? Why is it necessary? 7+3=10

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