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	PES University (Established under Karnataka Act No. 16 of 2013)	**UE20ME101**

B.TECH I SEMESTER - END SEMESTER ASSESSMENT – April 2021
UE20ME101 – MECHANICAL ENGINEERING SCIENCES

Time: 3 hours	**Answer All Questions** **Note: Draw neat sketches**	**Max. Marks: 100**

1a.	Write a short note on wind energy and wind mills.	**4**
1b.	Bring out the differences between 4 stroke petrol engine and 4 Stroke diesel engine with respect to the following: a. charge b. thermodynamic cycle c. compression ratio d. weight of the engineering e. Governing f. type of ignition	**6**
1c.	What is solar energy? Explain any two methods utilizing solar energy.	**4**
1d.	Explain the working of a open loop gas turbine with a sketch and mention the thermodynamic cycle on which it works?	**6**
2a.	With a sketch explain the 4 bar mechanism used in a IC engine.	4
2b.	What is the function of a rectangular key in a flange coupling? With sketch mention the type of drive for the following a. transmit power between 2 perpendicular shaft which are not intersecting and has a large velocity ratio. b. Transmit power from a motor to a drilling spindle, where the rpm can be changed.	**2+4**
2c.	In a open belt drive running in the clockwise direction the tension in the tight side is 3000N and the arc of contact is 150 ^{o}. If the coefficient of friction is 0.3. Find the tension on the slack side of the belt.	**4**
2d.	Two spur gears A and B connect two parallel shafts that are 500 mm apart. Gear A runs at 400 rpm and gear B at 200 rpm. If the circular pitch is given to be 30 mm. Calculate the number of teeth on gear A and B	**6**
3a.	What do you understand by a composite material? Give example List applications for any 1 metal and 1 non metal materials for engineering application.	2+2

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3b.	Two gauge marks are placed exactly 250 mm apart on a 12 mm diameter aluminium rod E=105GPa and that the maximum allowable normal stress is 180MPa. Knowing that the distance between the gage marks is 250.28mm after a load is applied, determine a. stress in rod b. the factor of safety	**4**
3c.	A 4-m-long steel rod must not stretch more than 3 mm and the normal stress must not exceed 150 MPa when the rod is subjected to a 10-kN axial load. Knowing that E = 200 GPa, determine the required diameter of the rod	**6**
3d.	With a stress-strain diagram, list the differences between brittle and ductile material with respect to a. ultimate strength b. type of fractures c. Break strength d. strain hardening	**2+4**
4a.	What is a pattern? List 4 pattern allowances.	2+2
4b.	What is green sand moulding Explain any 2 defects in sand casting?	**2+4**
4c.	Mention and sketch the type of threads used in the following (a) Screw jack / lead screw and (b) Metric Bolts and Nuts.	**4**
4d.	With a sketch explain the working of Gas welding process. Also explain the three types of flames of a welding torch.	**4+2**
5a.	Explain the following with sketch (1) Hot open die forging (2) Cold rolling	4
5b.	Explain the following operations in a lathe machines with sketch. Facing, plain turning and knurling.	**6**
5c.	With a sketch name the function of the following in a machine. A 3 jaw self centring chuck on a lathe A 4 jaw self centring chuck on a lathe A machine vice on a milling and drilling machine	**6**
5d.	List 4 differences between a conventional lathe machine and a CNC turning centre.	