PES UNIVERSITY	**PES University** (Established under Karnataka Act No. 16 of 2013)	**UE18ME101**

B.TECH MECHANICAL ENGINEERING SCIENCES
II SEMESTER Jan – May 2019
END SEMESTER ASSESSMENT
UE18ME101 – MECHANICAL ENGINEERING SCIENCES

Time: 3 hours	**Answer All Questions**	**Max. Marks: 100**

1a)	Discuss the salient features and drawbacks of conventional energy sources.	**4**
1b)	In the context of Nuclear Energy generation, State the uses of the following components. 1. Control Rods 2. Moderators 3. Condenser 4. Heat Exchanger	**4**
1c)	Discuss Sun as a source of energy, Explain four examples of devices used in practice that operate on solar energy.	**6**
1d)	By means of a skematic sketch explain the working of a hydro electric power plant	**6**
2a)	State Clausius and kelvin plank statements of second law of thermodynamics establishing their equivalance.	4
2b)	*Bring out the differences between impulse and reaction steam turbines.*	**4**
2c	With a skematic sketch explain the working of a 4 stroke petrol engine.	**6**
2d	*With a block diagram explain the components and working of a vapour compression refrigrator.*	**6**
3a	What is a spur gear. With the help of a sketch define the terms pitch circle, circular pitch and module as applied to a spur gear	4
3b	2 parallel shafts 6 m apart are provided with 300 mm and 400 mm diameter pulley and are connected by a cross belt. The direction of rotation of the follwe pulley is to be reversed by changing over to an open belt drive. What should be the length of the belt for the change.	**4**
3c	Sketch and explain power transmission devices which are used to 1. Convert rotary motion to linear translation movement. 2. Drive used to transmit power between two shafts whose center distance is more and driver and driven rotate in the same direction. 3. Drive used to transmit power between two shafts which are perpendicular to each other and intersecting .	**6**

3d	An electric motor provides 6 kW power to an open belt drive. The diameter of the motor pulley is 200 mm ant it rotates at 900 rpm. Calculate the tight and slack side tension in the belt if the ratio of driving tensions is 2.	**6**
4a	Explain the terms Youngs Modulus, Poisonns ratio, Rigidity Modulus and Bulk Modulus.	4
4b	A cast-iron tube is used to support a compressive load. Knowing that E = 69 GPa and that the maximum allowable change in length is 0.025%, determine (a) the maximum normal stress in the tube, (b) the minimum wall thickness for a load of 7.2 kN if the outside diameter of the tube is 50 mm.	**4**
4c	Draw the stress-strain diagram for Aluminium metal and explain the process of finding its yield point. Explain the terms ultimate strength, elastic range and type of failure clearly marking the same on the diagram.	**6**
4d	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**
5a	Explain the following with sketch (1) Hot forging (2) Cold rolling	4
5b	Name the elements of a gating system and discuss their function by means of a sketch.	**6**
5c	Fill in the blanks (1) Which type of hole is typically used when a fastener, such as a socket head cap screw, is required to sit flush with or below the level of a workpiece's surface ? (2) Which device is used in a lathe machine to clamp a round work piece ? (3) Which manufacturing process is typically conducted on a lathe, whereby a diamond shaped pattern is roll formed into metal? (4)What is the type of slot seen on a milling machine table which facilitate the fixing of a machine vice ? (5) In specification of lathe which parameter indicates the maximum diameter of the work piece that can be held on the lathe? (6) Which is the manufacturing process done to enlarge an already existing hole using a lathe machine?	**6**
5d	With a schematic sketch explain metal arc welding with a flux coated electrode. (1) Why should a welder wear a boot during metal arc welding. (2) Which metal is used for electrode when we use a non consumable electrode. (3) Which metal joining process do you suggest to join two electrical wires in a switch board. (4) In which metal welding process the base metal does not melt.	**4**