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<b>R-11 / R-13</b>
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**Code: 1G544**

II B.Tech. II Semester Supplementary Examinations May 2019

**Manufacturing Technology**

( Mechanical Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

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1. Define Pattern? List out the various types of patterns with neat sketches? 14M
2. a) Discuss the use of chills? Classify the types of chills? 6M  
b) What will be the solidification time for an 1100 mm diameter and 3m thick casting of aluminum if the mould constant is 2.2 sec/mm<sup>2</sup>? 8M
3. a) Write short notes on  
(i) Welding process (ii) Weldability 4M  
b) Briefly describe the oxy-acetylene welding equipment. 10M
4. a) Describe common welding defects. How are sub-surface defects detected? 10M  
b) Give precautions to enhance life of weld joints? 4M
5. a) Differentiate between hot rolling and cold rolling process? 7M  
b) Describe what occurs in metal when it is rolled. 7M
6. Discuss the following forming processes:  
a) Roll forming      b) Rubber press forming      c) Hydromechanical forming 14M
7. a) Explain centre burst defect in extrusion? 7M  
b) Simplify the advantages and disadvantages of extrusion 7M
8. Explain the laser beam machining process with working principle, advantages, disadvantages and applications of laser beam machining. 14M

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**R-11 / R-13**

**Code: 1GC42**

II B.Tech. II Semester Supplementary Examinations May 2019

**Probability & Stastics**

( Common to CE, ME & IT )

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions  
 All Questions carry equal marks (**14 Marks** each)

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1. a) Find the mean, median and mode for the following distribution.

x	15	20	25	30	35	40	45	50	55
y	2	22	19	14	3	4	6	1	1

6M

b) Find the rank correlation coefficient for the following data

x	5	2	8	1	4	6	3	7
y	4	5	7	3	2	8	1	6

8M

2. a) Box A contain 5 red and 3 white marbles and box B contains 2 red and 6 white marbles. If marble is drawn from each box, what is the probability that they are both of same colour.

7M

b) State and prove Baye's theorem.

7M

3. a) A random variable X has the following probability distribution

X	1	2	3	4	5	6	7	8
P(X)	K	2K	3K	4K	5K	6K	7K	8K

Find K and  $P(2 \leq X \leq 5)$ .

7M

b) If a random variable has the probability density function

$$f(x) = \begin{cases} k(x^2 - 1), & -1 \leq x \leq 3 \\ 0, & \text{elsewhere} \end{cases} \quad \text{find } k \text{ and } P\left(\frac{1}{2} \leq x \leq \frac{5}{2}\right).$$

7M

4. a) If a Poisson distribution is such that  $P(X=1) \cdot \frac{3}{2} = P(X=3)$ , find  $P(X \geq 1)$  and  $P(X \leq 3)$ .

7M

b) In a Normal Distribution, 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution.

7M

5. A population consists of five numbers 2, 3, 6, 8, 11. Consider all samples of size two which can be drawn without replacement from this population.

- Find (a) Population mean
- (b) Population Standard deviation
- (c) Mean of the sampling distribution of means
- (d) Standard deviation of the sampling distribution of means.

14M

6. a) A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence?

7M

b) A sample of 11 rats from a central population had an average blood viscosity of 3.92 with a standard deviation of 0.61. Estimate the 95% confidence limits for the mean blood viscosity of the population.

7M

7. a) An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level of significance. 7M
- b) An average breaking strength of steel rods is specified to be 18.5 thousand pounds. To test this sample of 14 rods were tested. The mean and standard deviations obtained were 17.85 and 1.955 respectively. Is the result of experiment significant? 7M
8. From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees. 14M

Employees			
Soft Drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

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Code: 1G542

II B.Tech. II Semester Supplementary Examinations May 2019

**Thermal Engineering-I**  
( Mechanical Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll Questions carry equal marks (**14 Marks** each)

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1. a) Why the actual cycle efficiency is much lower than the air standard cycle efficiency? List the major losses and differences in actual engine and air standard cycles. 9M  
b) Define briefly about optimum spark advance? 5M
2. a) Give complete classification of I.C engines. 7M  
b) Discuss the difference between theoretical and actual valve timing diagram of a C.I engine. 7M
3. a) Define Octane number? What is its significance in S.I engine combustion? 7M  
b) Discuss the desirable principles of combustion chamber design for S.I engines. 7M
4. a) "C.I engines can accept very lean overall mixture ratios but S.I engines cannot". Explain and discuss. 6M  
b) Compare air swirl in C.I engine with turbulence in S.I engine. 4M  
c) With the aid of a sketch, explain squish in C.I engines. 4M
5. The following results refer to a test on a petrol engine  
I.P = 30 kW , B.P = 26 kW, Engine speed = 1000 rpm, Fuel per brake power hour = 0.35 kg, C.V of the fuel = 43,900 kJ/kg Calculate i) Indicated thermal efficiency ii) Brake thermal efficiency iii) Mechanical Efficiency 14M
6. a) Describe with a neat sketch the construction and working of a single-stage single acting reciprocating air compressor. 7M  
b) A double acting compressor takes in air at 100 kPa and delivers it to the receiver at 1000 kPa. The speed is 200 rpm, diameter is 150 mm and stroke length is 220 mm. Calculate the capacity of the motor required. 7M
7. a) With the help of a neat sketch explain the working of a vane type compressor. 6M  
b) A centrifugal compressor operating at a pressure ratio of 4:1 has inlet temperature of 15°C. Calculate the overall diameter of impeller given that speed of operation 15000 rpm. Slip factor 0.9, power input factor 1.03, isentropic efficiency 0.85. 8M
8. a) What is surging in axial- flow compressors? What are its effects? Describe briefly. 7M  
b) With the help of velocity triangles derive the expression for power required to run a single stage axial flow compressor. 7M

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**R-11 / R-13**

**Code: 1G543**

II B.Tech. II Semester Supplementary Examinations May 2019

**Fluid Mechanics and Hydraulic Machines**

( Mechanical Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

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1. a) Define density, specific gravity, viscosity and kinematic viscosity  
b) Two horizontal plates are placed 1.25cm apart, the space between them being filled with oil of viscosity the poise. Let the shear stress its oil if upper plate is curved with a velocity of 2.5m/sec
2. Derive Bernoulli's equation from Euler's equations and what are the assumption made in it.
3. a) Explain Reynolds experiment with a neat sketch  
b) Classify different types of losses in pipe flow
4. a) Derive the force exerted by a jet on stationary inclined flat plates  
b) A Jet of water of diameter 50mm strikes a fixed plate in such a way that the angle between the plate and the jet is  $30^{\circ}$ .The force exerted in the direction of the jet is 1471.5N.Determine the rate of flow of water.
5. a) What are the different efficiencies of turbines?  
b) what do you mean by hydraulic machinery
6. A pelton wheel is to designed for a head of 60m when running at 200rpm the pelton wheel develops 95.6475 kw shaft power. The velocity of the buckets is 0.45 times the velocity of the jet overall efficiency =0.85 and coefficient of velocity is equal to 0.98.
7. Explain the Governing of pelton turbine with a neat sketch.
8. a) Give the difference between centrifugal pump and reciprocating pump  
b) Explain the Working of single acting reciprocating pump?

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Code: 1G541

II B.Tech. II Semester Supplementary Examinations May 2019

**Kinematics of Machinery**

( Mechanical Engineering )

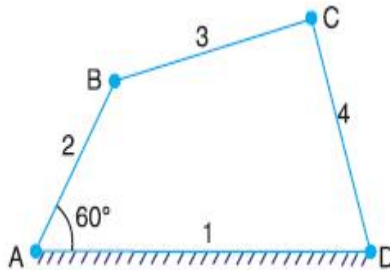
Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll Questions carry equal marks (**14 Marks** each)

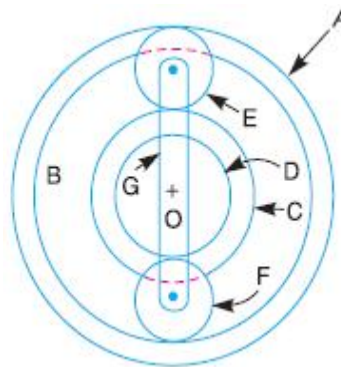
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1. What do you mean by inversion of a mechanism? Explain with sketches all inversions of quadric cycle chain.
2. a) Sketch a Peaucellier mechanism. Show that it can be used to trace a straight line.  
b) What is a Scott-Russel mechanism? What is its limitation? How it is modified?
3. Locate all the instantaneous centres for a four-bar mechanism as shown in Figure. The lengths of various links are:  $AD = 125$  mm;  $AB = 62.5$  mm;  $BC = CD = 75$  mm. If the link AB rotates at a uniform speed of 10 r.p.m. in the clockwise direction, find the angular velocity of the links BC and CD



4. Draw and explain Klien's construction for determining the velocity and acceleration of the piston in a slider crank mechanism.
5. A cam with 40 mm minimum radius is rotating clockwise at uniform speed of 1200 rpm. It has to operate a knife edge follower as defined below:
  - i) Follower has to move outward through 30 mm during 90° of cam rotation with uniform velocity
  - ii) Dwell for the next 30°
  - iii) Follower is to return to its starting position with SHM during next 120°.
  - iv) Follower is to dwell for the remaining period. Draw the cam profile taking the line of action of the follower passing through the center of the cam. Determine the maximum velocity and acceleration of the follower during the return stroke
6. a) State and prove the law of gearing. Show that involute profile satisfies the conditions for correct gearing.  
b) A pair of involute spur gears with 16° pressure angle and pitch of module 6 mm is in mesh. The number of teeth on pinion is 16 and its rotational speed is 240 r.p.m. When the gear ratio is 1.75, find in order that the interference is just avoided; 1. the addenda on pinion and gear wheel; 2. the length of path of contact; and 3. the maximum velocity of sliding of teeth on either side of the pitch point.

7. a) Explain the phenomena of slip & Creep in belt drives
- b) A rope pulley having a mean diameter of 1.5m rotates at 90 rpm. The angle of lap is  $170^\circ$  and the pulley groove angle is  $45^\circ$ . The safe tension per rope is 750N, and the coefficient of friction between the rope and sides of the groove is 0.25. Calculate the number of ropes required to transmit 50 kW of power
8. In an epicyclic gear train, the internal wheels A and B and compound wheels C and D rotate independently about axis O. The wheels E and F rotate on pins fixed to the arm G. E gears with A and C and F gears with B and D. All the wheels have the same module and the number of teeth are:  $T_C = 28$ ;  $T_D = 26$ ;  $T_E = T_F = 18$ .
- i. Sketch the arrangement; ii. Find the number of teeth on A and B ; iii. If the arm G makes 100 r.p.m. clockwise and A is fixed, find the speed of B ; and iv. If the arm G makes 100 r.p.m. clockwise and wheel A makes 10 r.p.m. counter clockwise; find the speed of wheel B.



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