

Code: 1G543

II B.Tech. II Semester Supplementary Examinations May 2018

Fluid Mechanics & Hydraulic Machinery

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

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

1. a) What is difference among gauge pressure ,vacuum pressure, absolute pressure. Give the list of devices used for measurement of pressure. 6M
- b) A 50cm diameter shaft revolves in a guide bearing of 80cm long at 1000rpm. If the oil film bearing is 0.15mm and viscosity of the oil is 0.07N-sec/m², Calculate (i) Force (ii) Torque (iii) Power absorbed. 8M
2. a) With neat sketches explain (i) path line (ii) Stream line (iii) Streak line (iv) stream tube 4M
- b) Derive Euler's equation of motion & Bernoulli's equation. Give the list of assumptions. 10M
3. a) In a pipe of 300mm diameter and 800mm length, an oil of specific gravity 0.8 is flowing at the rate of 0.45m³/sec. Find (i) head lost due friction (ii) power required to maintain the flow. Assume kinematic viscosity as 0.3 stokes. 7M
- b) Explain Orifice meter with a neat sketch and derive the equation for the discharge. 7M
4. A jet of water having a velocity of 30 m/sec strikes a series of radial curved vanes mounted on a wheel which is rotating at 200 rpm. The jet makes an angle of 20° with the tangent to the wheel at inlet and leaves the wheel with a velocity of 5m/sec at an angle of 130° to the tangent to the wheel at outlet. The outer and inner radii of the wheel are 0.5m and 0.25m respectively. Determine i) vane angles ii) Work done/Sec iii) Work done /weight of water iv) Efficiency of the wheel. 14M
5. a) Give the complete classification of Hydro electric power plants.. 4M
- b) With a the help of a neat sketch explain the working of Pumped storage Hydro Electric Power Plant and give the functions of each component. 10M
6. a) With the help of a neat sketch explain the working principle of Francis Turbine and give the function of each component. 7M
- b) A Kaplan turbine runner is to be designed to develop 7357.5 kW of shaft power under an available head of 5.5 m. Assume speed ratio as 2.09 ,flow ratio as 0.68 overall efficiency as 68% and the diameter of hub is 1/3 of diameter of runner. Calculate diameter of runner, diameter of hub and speed of the turbine. 7M
7. a) With a neat sketch explain the mechanism involved in governing of a turbine. 7M
- b) Define specific speed of a turbine and derive the equation for the same. Also give ranges of specific speeds of the turbine 7M
8. a) Give the differences between Reciprocating pump and Centrifugal pump. 6M
- b) External and internal diameter of Centrifugal pump are 600mm & 300mm respectively. The vane inlet angle is 30° and outlet angle is 45°.If the water enters the impeller at 2.5m/sec. Calculate (i) speed of impeller (ii) work done per unit weight of water. 8M

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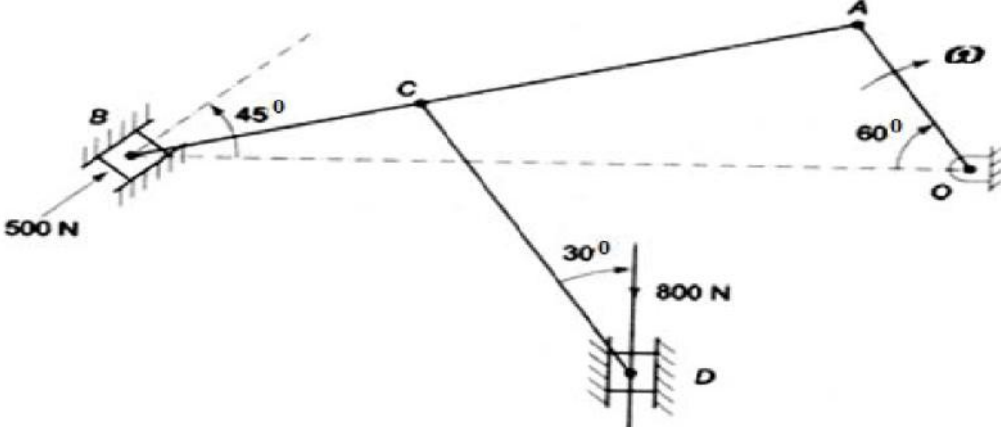
Kinematics of Machinery

(Mechanical Engineering)

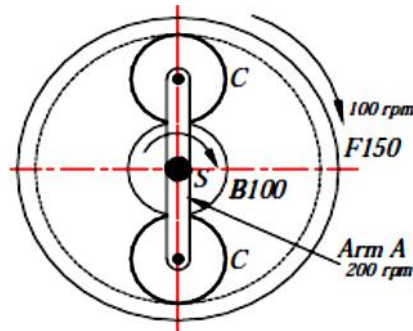
Max. Marks: 70

Time: 3 Hours

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

1. a) Explain the following terms with examples:
i. Element ii. Kinematic Pair iii. Lower Pair 7M
- b) Sketch and explain slider crank chain and its various inversions. 7M
2. a) What are straight line motion mechanisms? Sketch and explain Chebicheff straight line mechanism. 7M
- b) What are the conditions for correct steering? Sketch and explain Ackermans steering gear mechanism. 7M
3. The dimensions of various links in the mechanism shown in Figure 3 are $OA = 0.5\text{m}$; $AB = 1.5\text{m}$; $AC = CD = 0.9\text{m}$. The crank OA has uniform angular speed of 180 rpm. Determine the velocities of the sliders B and D **by the Instantaneous centre method**. 14M
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4. In a slider crank mechanism the length of the crank and connecting rod are 15cm and 60cm respectively. The crank position is 60° from the inner dead centre. The crank shaft speed is 150 rpm clockwise. Using Klein's construction, determine 1. Velocity and acceleration of the slider, 2. Velocity and acceleration of point D on the connecting rod which is 15cm from crank pin C and 3. Angular velocity and angular acceleration of the connecting rod. 14M
5. a) What is the function of a CAM? 2M
- b) Design a cam to raise a valve with simple harmonic motion through 50 mm in $1/3$ of a revolution, keep it fully raised through $1/12$ revolution and to lower it with harmonic motion in $1/6$ revolution. The valve remains closed during the rest of the revolution. The diameter of the roller is 20 mm and the minimum radius of the cam is 25 mm. The diameter of the camshaft is 25 mm. The axis of the valve rod passes through the axis of the camshaft. If the camshaft rotates at uniform speed of 100 r.p.m. Find the maximum velocity and acceleration of a valve during raising and lowering. 12M

6. a) Briefly discuss the phenomena of interference in Toothed gearing. 4M
 b) Two gears in mesh have a module of 8mm and a pressure angle of 20° . The larger gear has 57 while the pinion has 23 teeth. If the addenda on pinion and gear wheel are one module, find
 i. The number of pairs of teeth in contact
 ii. Angle of action of the pinion and the gear wheel. 10M
7. a) Explain the phenomena of slip & Creep in belt drives. 4M
 b) A rope pulley having a mean diameter of 1.5m rotates at 90 rpm. The angle of lap is 170° and the pulley groove angle is 45° . 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. 10M
8. a) What is a reverted gear train?
 b) In an epicyclic gear train shown in figure, the arm A is fixed to the shaft S. The wheel B having 100 teeth rotates freely on the shaft S. The wheel F having 150 teeth driven separately. If the arm rotates at 200 rpm and wheel F at 100 rpm in the same direction; find (a) number of teeth on the gear C and (b) speed of wheel B. 12M



12M

Hall Ticket Number :

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R-11 / R-13

Code: 1G544

II B.Tech. II Semester Supplementary Examinations May 2018

Manufacturing Technology

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

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

1. a) Explain the principles of a gating system with neat sketch? 7M
b) What do you mean by pattern allowance? Explain different pattern allowances. 7M
2. a) Explain the investment casting process with neat sketch. 7M
b) Give the relevance of the following with reference to a casting
(i) Spruce (ii) Runner (iii) Ingate 7M
3. a) Describe the thermit welding process with applications? 7M
b) Write about gas welding equipment. 7M
4. a) Explain the TIG welding process with neat sketch. 7M
b) How is brazing different from soldering? Compare them with regard to methods adopted and their application? 7M
5. a) What is rolling? What are the various types of rolling mills? Explain them with neat sketch? 7M
b) Explain: i) Re- crystallization ii) Grain growth in hot working 7M
6. a) Describe the wire drawing process with sketch? 7M
b) Differentiate between compound and progressive dies 7M
7. a) Describe i) Forward extrusion ii) Backward extrusion 7M
b) Classify the various types of forging process? How smith forging differs from that of drop forging. 7M
8. a) Explain the principle and working of electrical discharge machining (EDM). 7M
b) What are the main applications of laser beam machining? Discuss its advantages and limitations. 7M

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R-11/R-13**Code: 1GC42**

II B.Tech. II Semester Supplementary Examinations May 2018

Probability and Statistics

(Common to CE, ME & IT)

Max. Marks: 70

Time: 3 Hours

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

1. a) Calculate the mean and standard deviation for the following

Size of item:	6	7	8	9	10	11	12
Frequency:	3	6	9	13	8	5	4

7M

- b) Find the Correlation Coefficient between industrial production and export using the following data and comment on the result.

Production (in crore tons)	55	56	58	59	60	60	62
Export (in crore tons)	35	38	38	39	44	43	45

7M

2. a) Two cards are drawn at random from an ordinary deck of 52 playing cards. What is the probability of getting two aces if

- i) The first card is replaced before the second card is drawn;
 ii) The first card is not replaced before the second card is drawn?

6M

- b) State and Prove Baye's theorem.

8M

3. a) A discrete random variable X has the following probability distribution given below:

Value of X	0	1	2	3	4	5	6	7
$P(X = x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2 + k$

- (i) Find the value of 'k'. (ii) Find
- $P(X < 6)$
- ,
- $P(0 < X < 4)$
- and
- $P(X \geq 6)$
- .

7M

- b) Find the value of
- k
- and the distribution function
- $F(x)$
- given the probability density function of a random variable X as:
- $f(x) = \frac{k}{x^2 + 1}$
- ,
- $-\infty < x < \infty$
- .

7M

4. a) Find the mean and variance for the Poisson distribution.

7M

- b) An aptitude test for selecting offers in a bank is conducted on 1000 candidates. The average score is 42 and the standard deviation of score is 24. Assuming normal distribution for the scores, find

- (i) The number of candidates whose scores exceed 60;
 (ii) The number of candidates whose scores lie between 30 and 60.

7M

5. A population consists of five numbers 2, 3, 6, 8 and 11. Consider all possible samples of size 2 that can be drawn with replacement from this population. Find

- a) The mean of the population.
 b) The standard deviation of the population.
 c) The mean of the sampling distribution of means and
 d) The standard deviation of the sampling distribution of means

14M

6. a) Explain the following:
- Point estimation
 - Interval estimation
- b) Determine a 95% confidence interval for the mean of a normal distribution with variance $\sigma^2 = 0.25$, using a sample of $n = 100$ values with mean $\bar{x} = 212.3$.

8M

6M

7. a) Two samples of sodium vapor bulbs were tested for length of life and the following results were returned :

	Size	Sample mean	Sample S.D.
Type I	8	1234 hrs	36 hrs
Type II	7	1036 hrs	40 hrs

Is the difference in the means significant to generalize that type I is superior to type II regarding length of life? Use a 0.05 level of significance.

7M

- b) In a random sample of 100 tube lights produced by company A, the mean life time of tube light is 1190 hours with standard deviation of 90 hours. Also in a random sample of 75 tube lights from company B the mean life time is 1230 hours with standard deviation of 120 hours. Is there a difference between the mean lifetimes of the two brands of tube lights at a significance level of 0.05?
8. a) Transceivers provide wireless communication among electronic components of consumer products. Responding to a need for a fast, low-cost test of Bluetooth-capable transceivers, engineers developed a product test at the water level. In one set of trails with 60 devices selected from different wafer lots, 48 devices passed. Test the null hypothesis $p = 0.70$ against the alternative hypothesis $p > 0.70$ at the 0.95 level of significance.

7M

6M

- b) To determine whether there really is a relationship between an employee's performances in the company's training program and his or her ultimate success in the job, the company takes a sample of 400 cases from its very extensive files and obtains the results shown in the following table:

Performance in training program					
Success in job (employer's rating)		Below Average	Average	Above Average	Total
	Poor	23	60	29	112
	Average	28	79	60	167
	Very good	9	49	63	121
	Total	60	188	152	400

Use the 0.01 level of significance to test the null hypothesis that performance in the training program and success in the job are independent.

8M

Code: 1G542

II B.Tech. II Semester Supplementary Examinations May 2018

Thermal Engineering - I
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

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

1. a) Derive an expression for the thermal efficiency of Otto cycle and draw P-V & T-S diagrams. 7M
- b) Define blow down losses and volumetric efficiency 7M
2. a) Write a short notes on the following
 - (i) Scavenging
 - (ii) Valve timing diagram of 4-stroke diesel engine
 - (iii) Function of carburetor
 - (iv) Why water cooling system is more efficient than air cooling system 8M
- b) Explain any one method of ignition system that is employed in S.I engines with neat sketch. 6M
3. a) Explain the combustion phenomenon in SI Engines. 7M
- b) What are the various factors influencing the combustion in SI Engines? 7M
4. a) Explain the phenomenon of knocking in diesel engine. What are the effects of knocking? 7M
- b) What do you understand by Ignition delay and preignition in diesel engine 7M
5. A four stroke four cylinder diesel engine running at 300 rpm produces 250 kW of brake power. The cylinder dimensions are 30 cm bore and 25 cm stroke. Fuel consumption rate is 1 kg/min while air fuel ratio is 10. The average indicated mean effective pressure is 0.8 MPa. Determine
 - (i) Indicated power (ii) Mechanical efficiency
 - (iii) Brake thermal efficiency and (iv) Volumetric efficiency of engine.
 The calorific value of fuel is 43 MJ/kg. The ambient conditions are 1.013 bar, 27°C. 14M
6. a) Derive an expression for minimum work required for two stage reciprocating air compressor with perfect inter-cooling and neglect clearance volume. 7M
- b) A single stage single acting air compressor delivers 14 m³ of free air from 1 bar to 7 bar. The speed of the compressor is 300 r.p.m. Assuming the compression and expansion follows $PV^{1.35} = \text{Constant}$ and clearance is 5% of the swept volume, find the diameter and stroke of the compressor. Consider stroke length is 1.5 times the bore dia. 7M
7. a) With the help of neat sketch, explain the working of vane type blower. 7M
- b) Define and Explain the terms: (i) Pressure coefficient (ii) Adiabatic coefficient of a centrifugal compressor. 7M
8. a) An axial flow compressor is to have constant axial velocity of 250 m/s and 50% degree of reaction. The mean diameter of blade ring is 45 cm and speed is 18000 r.p.m. The exit angles of the blade are 25°. Calculate blade angle at inlet and work done per kg of air with the help of velocity triangles. 10M
- b) Differentiate between axial flow compressors and centrifugal compressors 4M
