

Hall Ticket Number :										
----------------------	--	--	--	--	--	--	--	--	--	--

R-11/R-13

Code : 1GC43

II B.Tech. II Semester Supplementary Examinations May 2017

Environmental Science

(Common to CE, ME & CSE)

Max. Marks: 70

Time: 03 Hours

Answer any five questions

All Questions carry equal marks (14 Marks each)

1. a) Define environment. List any five eminent environmentalists. 7M
b) What are the different methods to propagate environment awareness in the society? 7M
2. a) Discuss the advantages and problems associated with dams? Give examples. 7M
b) Comment on the different types of energy harnessed from oceans? 7M
3. a) Explain the environmental implications of mining with a case study? 7M
b) How can you as an individual conserve different natural resources? 7M
4. a) Briefly explain the causes, effects and control measures of noise pollution? 7M
b) Disasters are disastrous. Justify and suggest suitable management strategies? 7M
5. a) With a neat sketch, explain the functioning of hydrological cycle? 7M
b) Discuss the salient features of an estuarine ecosystem? 7M
6. a) Define biodiversity. Classify the types of biodiversity with examples? 7M
b) What is a hotspot? Describe the biodiversity hotspots identified in India? 7M
7. a) Discuss the impact of global warming on ecological system? 7M
b) Explain briefly the objectives and practices of rainwater conservation. 7M
8. a) Describe the problems created by the growing population of the earth. 7M
b) Highlight the role of information technology for environment management. 7M

Code : 1G543

II B.Tech. II Semester Supplementary Examinations May 2017

Fluid Mechanics & Hydraulic Machinery

(Mechanical Engineering)

Max. Marks: 70**Time: 03 Hours**Answer any **five** questionsAll Questions carry equal marks (**14 Marks** each)

1. a) Explain physical properties of fluids? 4M
b) A U-tube differential manometer connects two pressure pipes A and B. Pipe A contains carbon tetrachloride having a specific gravity 1.594 under a pressure of 11.772 N/cm^2 and Pipe B contains oil of specific gravity 0.9 under a pressure of 12 N/cm^2 . The pipe A lies 2.5m above pipe B. Find the difference of pressure measured by mercury as fluid filling U-tube. 10M
2. a) Define stream line, path line, Stream tube and streak lines 4M
b) Develop the Euler's equation of motion and then derive Bernoulli's equation. List all some practical applications 10M
3. a) Can you illustrate hydraulic gradient and total energy lines? 4M
b) A pipe line 2000 m long is used for power transmission. 110KW is to be transmitted through the pipe in which water having a pressure of 5000 KN/m^2 at inlet is flowing. If the pressure drop over the length of the pipe is 1000 KN/m^2 and co-efficient of friction is 0.0065, estimate: (i) the diameter of the pipe, and (ii) efficiency of the transmission. 10M
4. a) How would you explain impact of jets? Can you provide an expression for the force exerted by the jet on the normal moving plate. 4M
b) A jet of water of diameter 60 mm moving with a velocity of 40 m/s, strikes a curved fixed plate tangentially at one end at an angle of 30° to horizontal. The jet leaves the plate at an angle of 20° to the horizontal. Find the force exerted by the jet on the plate in the horizontal and vertical directions. 10M
5. a) Describe concept of pumped storage plants? 4M
b) The catchment area at a proposed site for a hydropower plant is 250 km^2 and possible head of water is 145m. The average annual rainfall is 150cm and the losses are 18%. How much power can be developed? 10M
6. a) How do you classify hydraulic turbines? 4M
b) A Francis turbine has a diameter of 1.4m and rotates at 430 rpm. Water enters the runner without shock with a flow velocity of 9.5 m/s and leaves the runner without whirl with an absolute velocity of 7 m/s. The difference between the sum of the static and potential heads at entrance to the runner and at the exit from the runner is 62 m. the turbine develops 12.25 MW. The flow rate through the turbine is $12 \text{ m}^3/\text{s}$ for a net head of 115 m. 10M
7. a) What is the necessity of governing the turbine? How do you select turbine? 7M
b) Describe cavitation, surge tank and water hammer? 7M
8. a) Derive an expression for the work done by the impeller of a centrifugal pump on liquid per second per unit weight of liquid. 7M
b) Explain basic working principle of reciprocating pump? Differentiate between centrifugal and reciprocating pumps? 7M

Code: 1G541

II B.Tech. II Semester Supplementary Examinations May 2017

Kinematics of Machinery

(Mechanical Engineering)

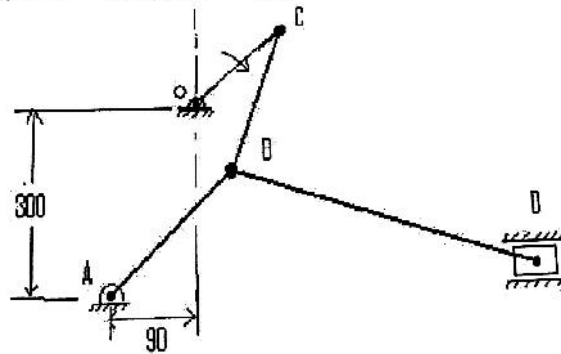
Max. Marks: 70

Time: 3 Hours

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

1. a) Sketch all the inversions of a single slider crank chain. Give the applications of each of them. 7M
- b) What is a double slider crank chain? State its inversions and show them schematically. Give an example for each of its applications. 7M
2. a) Explain the working of Peaucellier exact straight line mechanism. 7M
- b) With a neat sketch explain Davis steering gear mechanism. 7M
3. In a mechanism shown in figure, determine the velocity and acceleration of slider 'D'. Also find the angular velocity of line BD. The crank OC rotates at 180rpm.

$$CB = 300, AB = 200, BD = 450$$



4. The crank and connecting rod of a reciprocating engine are 20 cm and 70 cm respectively. The crank is rotating in clockwise direction at 120 rad/sec. Find with the help of Klein's construction: **a.** Velocity and acceleration of the piston. **b.** Velocity and acceleration of the midpoint of the connecting rod. **3.** Angular velocity and acceleration of the connecting rod at the instant when the crank is at 30° to IDC position of the crank. 14M
5. Draw the profile of the cam operating a roller reciprocating follower and with the following data.

Minimum radius of the cam = 25 mm

Lift = 30 mm

Roller Diameter = 15 mm

The cam lifts the follower for 120° with SHM followed by dwell period of 30° . Then the follower lowers down during 150° of the cam rotation with uniform acceleration and deceleration followed by a dwell period. If the cam rotates at a uniform speed of 150rpm, calculate the maximum velocity and acceleration of the follower during the descent period. 14M

6. a) What is interference in gear wheels? What are the causes of interference? What are the possible methods to avoid interference? 7M
- b) Two 20° involute spur gears mesh externally and give a velocity ratio 3. Module is 3 mm and the addendum is equal to 1.1 module. If the pinion rotates at 120 rpm, determine
- i) The minimum number of teeth on each wheel to avoid interference
 - ii) The number of pairs of teeth in contact. 7M
7. a) Briefly discuss the advantages of rope drives over the belt drives. 4M
- b) The grooves on the pulleys of a multiple rope drive have an angle of 50° and accommodate ropes of 22mm diameter having a mass of 0.8kg per meter length for which a safe operating tension 1200N has been laid down. The two pulleys are of equal size. The drive is designed for maximum power condition. Speed of both the pulleys is 180 rpm. Assuming coefficient of friction as 0.25, determine the diameters of the pulleys and the number of ropes when the power transmitted is 150kW. 10M
8. a) Differentiate Simple and Compound gear trains. 4M
- b) In an epicyclic gear train shown in Fig, the arm A is fixed to the shaft S. The Wheel B having 100 teeth rotates freely on the shaft S and a wheel F with 150 teeth is separately driven. If the arm A runs at 200 rpm and the wheel F at 100 rpm in the same direction, find
- a) Number of teeth on wheel C
 - b) Speed of wheel B. 10M

Hall Ticket Number :

--	--	--	--	--	--	--	--	--	--	--

R-11/R-13

Code : 1G544

II B.Tech. II Semester Supplementary Examinations May 2017

Manufacturing Technology

(Mechanical Engineering)

Max. Marks: 70

Time: 03 Hours

Answer any **five** questions

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

1. a) Discuss various types of patterns in detail with examples List out the factors to be considered in the selection of pattern materials. 8M
b) Define gating ratio? Explain prescribed and unpressurised gating systems 6M
2. a) Define directional solidification? Explain the factors controlling directional solidification? 6M
b) Sketch and explain an Investment casting method in detail. Give its applications 8M
3. a) With the help of a neat sketch explain the working of (i) plasma arc welding process and (ii) submerged arc welding process 7M
b) Briefly describe the Oxy-Acetylene welding technique with a neat sketch 7M
4. a) Sketch and explain the working principles of (i) Friction welding and (ii) Braze welding. Give their applications 8M
b) Give the advantages and limitations of TIG welding over MIG welding. List out any three weld defects. 6M
5. a) Define and explain the terms (i) cold working and (ii) hot working. Discuss the effects of cold working and hot working on the properties of materials. Explain their advantages and disadvantages 7M
b) Describe the rolling process in detail with the help of a sketch. Explain the factors effecting roll pressure 7M
6. a) Sketch and explain wire drawing and Tube drawing processes in detail. Give their applications and advantages. 7M
b) Explain spinning and coining processes by means of sketches in detail. State their advantages. 7M
7. a) Classify extrusion processes. With a neat sketch explain Hydrostatic extrusion 7M
b) What is meant by Upset Forging? Sketch and explain it in detail. Mention Forging defects and remedies 7M
8. a) Discuss in brief about 'unconventional machining' processes. List out its types. 6M
b) Describe with the help of a neat sketch 'ultrasonic machining' process 8M

Hall Ticket Number :										
----------------------	--	--	--	--	--	--	--	--	--	--

R-11 / R-13

Code: 1GC42

II B.Tech. II Semester Supplementary Examinations May 2017

Probability and Statistics

(Common to CE, ME & IT)

Max. Marks: 70

Time: 3 Hours

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

1. a) Find mean, median and mode from following data

X	15	25	35	45	55	65	75	85
f	5	9	13	21	20	15	8	3

7M

b) Calculate the coefficient of correlation between age of cars and annual maintenance cost

Age of cars(years)	2	4	6	7	8	10	12
Annual maintenance cost (Rupees)	1600	1500	1800	1900	1700	2100	2000

7M

2. a) Two marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue and 15 orange marbles, with replacement being made after each draw. Find the probability that (i) both are white (ii) first is red and second is white.

7M

b) Of the three men, the chances that a Politician, a business man or an academician will be appointed as a vice-chancellor (V.C) of a University are 0.5, 0.3, 0.2 respectively. Probability that research is promoted by these persons if they are appointed as V.C are 0.3, 0.7, 0.8 respectively. Determine

- (i) The probability that research is promoted.
- (ii) If research is promoted, what is the probability that V.C is an academician?

7M

3. a) Find the mean and variance of the uniform probability distribution given by

$$f(x) = \frac{1}{n} \text{ for } x = 1, 2, 3, \dots, n$$

7M

b) A continuous random variable has the probability density function

$$f(x) = \begin{cases} kxe^{-\lambda x}, & \text{for } x \geq 0, \lambda > 0 \\ 0, & \text{otherwise} \end{cases}$$

Determine (i)k (ii)Mean (iii) Variance

7M

4. a) Derive mean and variance of Binomial Distribution

7M

b) If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that (i) $26 \leq X \leq 40$ (ii) $X \geq 45$

7M

5. A Population consists of five numbers 2,3,6,8 and 11. Consider all possible samples of size two which can be drawn without 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) To estimate the average time it takes to assemble a certain computer component, the industrial engineer at an electronics firm timed 40 technicians in the performance of the task, getting a mean of 12.73 minutes and a standard deviation of 2.06 minutes.
- i. What can we say with 99% confidence about the maximum error?
 - ii. Use the given data to construct a 99% confidence interval. 7M

- b) In a random sample of 400 industrial accidents, it was found that 231 are due to unsafe working conditions. Construct a 99% confidence interval for the corresponding true proportions. 7M

7. a) A lady stenographer claims that she can take dictation at the rate of 118 words per minute. Can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words and a standard deviation of 15 words at 5% level of significance? 7M

- b) Two independent samples of 8 and 7 items respectively have the following values.

Sample-1	11	11	13	11	15	9	12	14
Sample-2	9	11	10	13	9	8	10	-

Is the difference between the means of samples significant? 7M

8. a) In a large consignment of oranges, a random sample of 64 oranges revealed that 14 oranges were bad. Is it reasonable to ensure that 20% of the oranges are bad at 5% level of significance? 7M

- b) The following data come from a study in which random samples of the employees of three government agencies were asked about their pension plan. Use .01 level of significance to test the null hypothesis that the actual proportions of the employees favoring the pension plan are same.

	Agency-I	Agency-II	Agency-III
For the Pension Plan	67	84	109
Against the Pension Plan	33	66	41

7M

Code: 1G542

II B.Tech. II Semester Supplementary Examinations May 2017

Thermal Engineering - I

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

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

1. a) Compare the actual and fuel-air cycles of a gasoline engine. 8M
 b) Define volumetric efficiency and discuss the effect of various factors affecting the volumetric efficiency. 6M
2. a) With a neat sketch explain the working principle of a simple carburetor. 8M
 b) Compare liquid and air cooling systems with their limitations. 6M
3. a) Explain the various factors that influence the flame speed. 7M
 b) What is meant by abnormal combustion? Explain the phenomena of knock in SI engines. 7M
4. a) Bring out clearly the process of combustion in CI engines and also explain the various stages of combustion. 8M
 b) Explain the phenomena of knock in CI engines and compare it with SI engines. 6M
5. A six cylinder gasoline engine works on a four stroke cycle. The bore of each cylinder is 80 mm and the stroke 100 mm. The clearance volume per cylinder is 70 cc. At a speed of 4000 rpm the fuel consumption is 20kg/h and the torque developed is 150 Nm. Calculate (i) the brake power (ii) the brake mean effective pressure (iii) brake thermal efficiency, if the calorific value of the fuel is 43000 kJ/kg and (iv) relative efficiency on brake power basis, assuming the engine works on the constant volume cycle. Take $\gamma = 1.4$ for air 14M
6. A single stage double acting compressor has a free air delivery (F.A.D.) of 14 m³/min, measured at 1.013 bar and 15°C. The pressure and temperature in the cylinder during induction are 0.95 bar 32°C. The delivery pressure is 7 bar and index of compression and expansion, $n=1.3$. The clearance volume is 5% of swept volume. Calculate i) indicated power required, and ii) volumetric efficiency. 14M
7. A centrifugal compressor used as a supercharger for aero-engines handles 150 kg/min of air. The suction pressure and temperature are 1 bar 17°C. the suction velocity is 80 m/s. After compression in the impeller the conditions are 1.5 bar 72°C and 220 m/s. Calculate (i) isentropic efficiency (ii) power required to drive the compressor (iii) overall efficiency of the unit.
 It may be assumed that K.E. of air gained in the impeller is entirely converted into pressure in the diffuser. 14M
8. An axial flow compressor with an overall isentropic efficiency of 85% draws air at 20°C and compresses it in the pressure ratio of 4:1. The mean blade speed and flow velocity are constant throughout the compressor. Assuming 50% reaction blading and taking blade velocity as 180 m/s and work input factor as 0.82, calculate: (i) flow velocity (ii) number of stages
 Take $\beta_1 = 12^\circ$, $\beta_2 = 42^\circ$. 14M
