Code: 7G246

ll B.Tech. ll Semester Regular & Supplementary Examinations November 2020

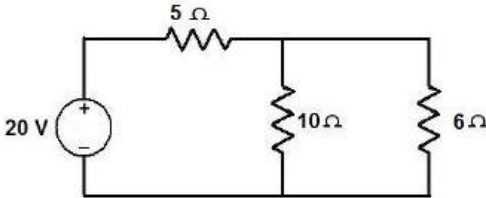# Electrical and Electronics Engineering

(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)

****

			Marks	CO	Blooms Level
1.	a)	(i) State and explain ohms law. (ii) Explain about linear circuit with example.	8M	CO1	L2
	b)	Explain the equations for resistors in equivalent star. If the resistors Ra, Rb and Rc are connected electrically in Delta?	6M	CO1	L5
2.	a)	Define (i) Unilateral & Bilateral elements (ii) Active & Passive elements with examples.	6M	CO1	L2
	b)	Find the power consumed by each resistor	8M	CO1	L3

			Marks	CO	Blooms Level
3.	a)	Explain the principle of operation of DC generator.	6M	CO2	L2
	b)	Calculate the induced emf by 4 pole wave wound generator having 65 slots with 12 conductors per slot when driven at 1200 rpm the flux per pole is 0.02 wb?	8M	CO2	L3
4.	a)	Derive the torque equation of DC motor?	6M	CO2	L5
	b)	Explain the different speed control methods of DC motor	8M	CO2	L4
5.	a)	Explain the principle of operation of three phase induction motor.	6M	CO3	L2
	b)	Explain how to find the regulation of alternator by using synchronous impedance method.	8M	CO3	L4
6.	a)	Explain the constructional details of Bipolar Junction Transistor	6M	CO4	L2
	b)	Explain how transistor acts as an Amplifier	8M	CO4	L4
7.	a)	Explain the theory of Dielectric heating and state its applications.	7M	CO5	L2
	b)	Explain the theory of Induction heating and state its applications.	7M	CO5	L2
8.	a)	What are the functions of Electron gun and accelerating anode in the CRT?	8M	CO5	L4
	b)	Explain the various applications of CRO	6M	CO5	L1

*****

Code: 7GC41

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

Environmental Science

(Common to CE & ME)

Max. Marks: 70   Time: 3 Hours

Answer any five questions from the following (5 x 14 = 70 Marks)

****

Marks

1.	a)	Define environmental studies. Why it is called a multidisciplinary subject?	7M
	b)	Discuss the scope and importance of environmental studies.	7M
2.	a)	Discuss the impact on environment by the extraction of minerals.	7M
	b)	Briefly explain the role of individual on the conservation of natural resources.	7M
3.	a)	Explain the structure of an ecosystem.	7M
	b)	Discuss the food chains and the food webs.	7M
4.	a)	Explain the consumptive and productive value of biodiversity.	7M
	b)	Discuss the In-situ conservation of biodiversity.	7M
5.	a)	Explain the causes, ill effects and remedial measures of air pollution.	7M
	b)	Write notes on soil pollution.	7M
6.	a)	Define environmental pollution? Explain thermal pollution.	7M
	b)	Discuss the causes, ill effects and remedial measures of Nuclear hazards.	7M
7.	a)	Explain the conservation of water by rain water harvesting technique.	7M
	b)	Give the salient features of Air Act.	7M
8.	a)	Write notes on Acid rains.	7M
	b)	Explain the Family Welfare programme.	7M

****

Code: 7G542

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

Fluid Mechanics and Hydraulic Machinery
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)
****

			Marks	CO	Blooms Level
1.	a)	Define the following fluid properties: Mass density, Weight density and Specific gravity. Give their SI units.	6M	1	1
	b)	The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm.	8M	1	2, 3, 4
2.	a)	Explain the terms: Path line, Stream line, Streak line and Stream tube.	8M	1	2, 3
	b)	Distinguish between: (i) Steady and unsteady flow, (ii) Uniform and non-uniform flow and (iii) Rotational and irrotational flow.	6M	1	1, 2
3.	a)	Derive the Bernoulli's energy equation along a streamline. State the assumptions involved in the derivation.	10M	2	3
	b)	Water is flowing through a pipe having diameter 300mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525N/cm^2 and the pressure at the upper end is 9.81N/cm^2. Determine the difference in datum head if the rate of flow through the pipe is 40 litres/s.	4M	2	2, 3, 4
4.	a)	Derive the Darcy-Weisbach equation for the loss of head due to friction in pipes.	8M	2	3
	b)	An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20cm. and throat diameter 10cm. The oil- mercury differential manometer shows a reading of 25cm. Calculate the discharge of oil through the horizontal venturimeter. Take C_d=0.98.	6M	2	2, 3, 4
5.	a)	What is a hydropower plant? What are the different types of hydropower plants? Describe each one briefly.	10M	3	2, 3
	b)	Explain the difference between storage and pondage.	4M	3	2, 3
6.	a)	Explain the classification of hydraulic turbines.	8M	4	1, 2
	b)	A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 0.7m^3/s under a head of 30 m. The buckets deflect the jet through an angle of 160^0. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume Co-efficient of velocity as 0.98.	6M	4	2, 3, 4
7.	a)	Define the specific speed of a turbine. Derive an expression for the specific speed of a turbine. What is the significance of the specific speed?	10M	4	1, 2
	b)	A turbine develops 500 kW power under a head of 100m at 200 r.p.m. What would be its normal speed and output under a head of 81m?	4M	4	2, 3, 4
8.	a)	What is a reciprocating pump? Describe the principle and working of a reciprocating pump with a neat sketch.	8M	5	1, 2, 3
	b)	A single-acting reciprocating pump, running at 50 r.p.m., delivers 0.01m^3/s of water. The diameter of the piston is 200mm and stroke length is 400mm. Determine the: (i) Theoretical discharge of the pump, (ii) Co- efficient of discharge and(iii) Slip and the percentage slip of the pump.	6M	5	2, 3, 4

*****

II B.Tech. II Semester Regular & Supplementary Examinations November 2020
Kinematics of Machinery
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)
****

		Marks	CO	Blooms Level
1. a)	What is a machine? Differentiate between machine and structure?	4M	CO1	L1
b)	Sketch and explain Whitworth quick return mechanism.	10M	CO1	L2
2. a)	Define 'Degree of Freedom'. Explain Kutzbach criterion?	6M	CO1	L1
b)	What is double slider crank chain? Explain elliptical trammel with neat sketch?	8M	CO1	L2

3. The crank and connecting rod of a theoretical steam engine are 0.5m and 2m long respectively. The crank makes 180 rpm in the clockwise direction. When it has turned 45^0 from the inner dead center position, determine:
   i) Velocity of piston
   ii) Angular velocity of connecting rod
   iii) Velocity of point E on the connecting rod 1.5 m from   gudgeon pin.
   iv) Velocities of rubbing at the pins of the crank shaft, crank and cross head when the diameters of their pins are 50mm, 60 mm and 30 mm respectively.
   v) Position and linear velocity of any point G on the connecting rod which has the least velocity relative to crank shaft.   14M CO2 L3

4. In a four bar mechanism PQRS, PS is fixed link of length 120 mm. Crank PQ is 45 mm rotates at 200 rpm and an acceleration of 150 rad/sec^2 at an instant when crank makes an angle 45^0 to the horizontal. Both are clockwise in nature. The link QR is 90 mm and link RS is 60 mm. Find the acceleration of Q and R.   14M CO2 L3

5. Name the different mechanisms, which are used for mathematically correct straight line motion. Sketch and explain The Hart's straight line motion mechanism.   14M CO3 L2

6. The following data refers to two mating 20^0 involute gears. Number of teeth on pinion is 20. Gear ratio = 2. Speed of pinion is 250 rpm. Module = 12mm. If the addendum of each wheel is such that the path of approach and path of recess on each side are half of the maximum permissible length, find :
   i) The addendum of pinion and gear
   ii) The length of arc of contact   14M CO4 L3

7. 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 90^0 of cam rotation with uniform velocity
   ii) Dwell for the next 30^0
   iii) Follower is to return to its starting position with SHM during next 120^0
   iv) Follower is to dwell for 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.   14M CO5 L3

8. From the following data draw the cam profile in which the follower moves with SHM during ascent and uniformly accelerated and decelerated motion during descent. The diameter of the roller follower is 30 mm and lift is 40mm.
   Angle of ascent = 48^0, angle of descent= 60^0, angle of dwell between ascent and descent = 42^0, The least radius of the cam is 50mm and the distance between line of action of the follower and axis of cam=20mm. If the cam rotates at 360 rpm CCW, find the maximum velocity and acceleration of the follower during ascent and descent.   14M CO5 L3

*****

Code: 7GC42

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

Probability and Statistics

(Common to Civil Engineering, ME & CSE)

Max. Marks: 70   Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)

****

Marks

1. 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 drawing. Find the probability that (i) both are white (ii) first is red and second is white.   7M

   b) The diameter of an electric cable say X is assumed to be a continuous random variable with Probability density function

   $f(x) = 6x(1-x)$; $0 \le x \le 1$.

   Find mean and variance.   7M

2. a) State and prove Baye's theorem.   7M

   b) The cumulative distribution function of a continuous random variable

   X is given by

   $$F(x) = \begin{cases} 0, & x < 0 \\ x^2, & 0 \le x < 1/2 \\ 1 - \dfrac{3}{25}(3-x)^2, & (1/2) \le x < 3 \\ 1, & x \ge 3 \end{cases}$$

   7M

   Find the pdf of x and evaluate $P((1/3) \le X < 4)$.

3. a) In a large consignment of electric bulbs 10% are defective. A random sample of 20 is taken for inspection. Find the probability that

   (i) All are good bulbs.

   (ii) At most there are three defective bulbs.

   (iii) Exactly there are three defective bulbs.   7M

   b) The weekly wages of 1000 workmen are normally distributed around a mean of Rs.70 with a standard deviation of Rs.5. Estimate the number of workers whose weekly wages will be (i) Between Rs.69 and Rs.72   (ii) Less than Rs.69   (iii)More than Rs.72.   7M

4. a) Fit a Poisson distribution for the following data and calculate the

   expected frequencies

x	0	1	2	3	4	5
f(x)	142	156	69	27	5	1

   7M

   b) Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys? Assume equal probabilities for boys and girls.   7M

5. a) A population consists of the four numbers 3, 7, 11, 15. Consider all possible samples of size 2 which can be drawn with replacement from this population. Find the population mean and standard deviation, and mean and standard deviation of the sampling distribution of means.   7M

   b) The standard deviation of the life-times of television tubes manufactured by a company is estimated as 100 hours. Find how large a sample must be taken in order to be 99% confident that the error in the estimated mean life-time will not exceed 20 hours   7M

6. a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence.200men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same at 5%level. 7M

b) Two random samples gave the following data

	size	mean	Variance
Sample I	8	9.6	1.2
Sample II	11	16.5	2.5

Is the difference between means significant? 7M

7. The following data give the number of air-craft accidents that occurred during the various days of a week

Day	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents	15	29	13	12	16	15

Test whether the accidents are uniformly distributed over the week. 14M

8. Two random samples drawn from two normal populations have the variable values as below:

Sample1	19	17	16	28	22	23	19	24	26			
Sample2	28	32	40	37	30	35	40	28	41	45	30	36

Obtain the estimate of the variance of the population and test whether the two populations have the same variance. 14M

****

Code: 7G541

II B.Tech. II Semester Regular & Supplementary Examinations November 2020
Applied Thermodynamics - I
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *any five* questions from the following (5 x 14 = 70 Marks)
****

			Marks	CO	BL
1.	a)	Derive an expression for an efficiency and Mean effective pressure of an Otto Cycle with neat P-V and T-S diagrams	8M	1	3
	b)	What will be the effect on the efficiency of an Diesel cycle having a compression ratio of 20, and cut-off ratio is 5% of swept volume, if C_v value decreases by 1%. Take C_v= 0.717kJ/kg K and R = 0.287 kJ/ kg K.	6M	1	3
2.	a)	Compare Otto, Diesel and Dual air standard cycles for i) Same Compression ratio and same heat rejection ii) Maximum pressure and temperature and same heat rejection.	6M	1	4
	b)	An engine working on air standard Otto Cycle has compression ratio of 5.5, pressure and temperature at the beginning of the compression as 1 bar and 27 ^{O}C respectively. If the maximum pressure is 30 bar, determine: (i) Pressure, volume and temperature at various salient points, (ii) Heat and work transfer in all the processes (ii) Efficiency of a cycle (iv) mean effective pressure. Take mass as 1 kg and = 1.4, C_p = 1.005 kJ/kg K, R =0.287kJ/kg K	8M	1	3
3.	a)	With neat sketches explain the port timing diagram of a two stroke SI engine	7M	2	2
	b)	With a neat Diagram explain the working principle of a simple carburetor	7M	2	2
4.	a)	Explain with a neat sketch the working principle of Magneto Ignition System	7M	2	2
	b)	With advantages and limitations describe the construction features and working principle of a wet sump lubrication system.	7M	2	2
5.	a)	Explain the various stages of combustion in SI Engines?	7M	3	2
	b)	With neat sketches classify types of combustion chambers used for SI engines	7M	3	2
6.	a)	Explain motoring test to find brake power	6M	4	2
	b)	The air flow to a four cylinder four stroke oil engine is measured by means of a 5 cm diameter orifice having a coefficient of discharge of 0.6. During a test on the engine, the following data were recorded; Bore = 10 cm, stroke = 12 cm, speed = 1200rpm, torque = 120N-m, fuel consumption = 5kg/hr, CV of fuel = 42MJ/kg, pressure drop across orifice is 4. 6 cm of water, ambient temperature and pressure are 17° C and 1 bar respectively. Calculate (i) $_{bth,}$ (ii) BMEP and (iii) $_{vol,}$ based free air condition.	8M	4	3
7.	a)	Explain the significance of Heat Balance Sheet	6M	4	2
	b)	A 4-S, 4-cylinder diesel engine running at 2000rpm develops 60kW. $_{bth}$ = 30% and CV of fuel is 42000kJ/kg. Engine has a bore of 120 mm and a stroke of 100mm. Take density of air 1.15kg/m^3, A/F = 15 and $_{mech}$ = 80 %. Calculate (i) fuel consumption, (ii) air consumption, (iii) $_{ith,}$(iv) $_{vol,}$ (v) BMEP (vi) Mean piston speed.	8M	4	3
8.	a)	Derive an expression for indicated work of a reciprocating air compressor by considering its clearance volume	10M	5	3
	b)	What are the differences between centrifugal and axial flow compressors	4M	5	2

*****