Code No.: 50H16 **MR15**

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: **ENVIRONMENTAL SCIENCES**

Branch: **COMMON TO CIVIL,ME**

Time: 3 hours **Max. Marks: 60**

PART – A

Answer ALL questions of the following **5x2M=10 M**

1. Discuss the significance of food chains food webs.
2. Differentiate between Renewable and non-renewable resources.
3. Differentiate between primary and secondary air pollutants.
4. Explain the important causes for ozone layer depletion.
5. Write a note on Clean Development Mechanism.

PART-B

Answer ANY FIVE questions of the following **5x10 M= 50M**

1. a) Discuss the different types of ecological pyramids.
   b) Explain the concept of food chain and food web in ecosystems with help of examples.

2. a) Discuss about importance of Ecosystems.
   b) Write a short note on forest eco-system.

3. a) Discuss the environmental impacts of major dams.
   b) Write a short notes on hydroelectric energy.

4. a) Explain the reasons for exploitation of groundwater in urban areas and discuss various methods to control groundwater depletion in urban areas.
   b) Explain the importance of biodiversity to the mankind.

5. a) Soil as sink for pollutants.
   b) Soil degradation activities.

6. a) List the gases responsible for global warming. Explain the possible consequences of green house effect.
   b) Discussing the importance of forests, explain the consequences of deforestation.

7. a) What is over-grazing? How does it contribute to environmental degradation?
   b)Importance of international conventions.

8. a) Explain about Environmental ethics and environmental economics.
   b) Explain the concept of sustainable development and environmental education.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: **PROBABILITY & STATISTICS**

Branch: **COMMON TO CE,ME**

Time: 3 hours **Max. Marks: 60**

PART – A

Answer ALL questions of the following **5x2M=10 M**

1. Define Probability.
2. Define discrete and continuous random variables.
3. Define parameter and statistic.
4. Define t-test statistic.
5. Write the limits of the Correlation Coefficient.

PART-B

Answer ANY FIVE questions of the following **5x10 M= 50M**

1. a) Suppose that we have two events, A and B, with $P(A) = 0.50$, $P(B) = 0.60$, and $P(A \cap B) = 0.70$. Find $P(A/B)$ and verify whether A and B are independent.

   b) State Bayes' theorem and explain a situation where this theorem can be applied.

2. A business man goes to hotels X, Y, Z 20%, 50%, 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faulty plumbing's. What is the probability that business man's room having faulty plumbing is assigned to hotel Z?

3. a) Average number of accidents on any day on a national highway is 1.8 determine the probability that the number of accidents are (i) at leat one (ii) at most one

   b) Compute the value of k, mean and variance of the following probability distribution:

Value of X, x	-3	-2	0	1	2
P(X=x)	2k	5k	4k	k	3k

4. a) Calculate expectation and variance of X ,if the probability distribution of the random variable X is given by

X	-1	0	1	2	3
Y	0.3	0.1	0.1	0.3	0.2

b) X is a discrete random variable prove that E(X+Y)=E(X)+E(Y).

5. a) Suppose 5% of the components produced by a machine were defective. After overhauling of the machine, 12 components were observed to be defective in a random sample of 400 components. Has the machine improved?

b) A random sample of size 81 was taken whose variance is 20.25 and mean is 32, construct 95% confidence interval.

6. A set of five similar coins is tossed 320 times and the result is as follows

No. of heads:	0	1	2	3	4	5
Frequency	6	27	72	112	71	32

Using the Chi-Square test of goodness of fit, Test the hypothesis that the data follows a Binomial Distribution.

7. In a test given to two groups of students drawn from two normal population marks obtained were as follows,

Group A : 18, 20, 36, 50, 49, 36, 34, 49, 41.
Group B : 29, 28, 26, 35, 30, 44, 46.

Examine the equality of vacancies at 5% level of significance.

8. Subhishi Store is a small local grocery store with only one checkout counter. Assume that shoppers arrive at the checkout lane according to a Poisson probability distribution, with an arrival rate of 15 customers per hour. The checkout service times follow an exponential probability distribution, with a service rate of 20 customers per hour. Compute:
   i) What is the probability that no customers are in the system?
   ii) What is the average number of customers that will be waiting for service?
   iii) What is the average time a customer will spend waiting for service?
   iv) What is the average number of customers in the system?
   v) What is the average time a customer will spend in the system?

Code No.: 50312

MR15

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: **DYNAMICS OF MACHINARY**

Branch: **ME**

Time: 3 hours **Max. Marks: 60**

PART – A

Answer ALL questions of the following **5x2M=10 M**

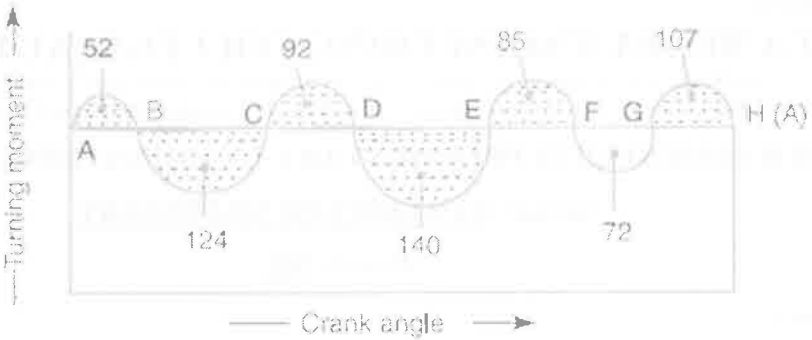
1. What is a Gyroscope? Mention any two of its applications.
2. Describe the classifications of synthesis problem.
3. What are flywheels? Where are they used?
4. A spring of stiffness K is cut in to four equal parts and three of them are connected in parallel. Calculate the stiffness of this parallel system of springs.
5. Define and explain the Iso chronism relating to governors.

PART-B

Answer ANY FIVE questions of the following **5x10 M= 50M**

1. The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship:
   i) When the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h.
   ii) When the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees.
2. a) Describe the gyroscopic effect on sea going vessels.
   b) Write the conditions for equilibrium of two and three members?
3. Synthesize a four bar linkage using Freudenstein's equation to generate the function $y = x^{1.8}$ for the interval $1 \leq x \leq 5$. The input crank is to start from $\theta_S = 30^0$ and is to have a range of 90°. The output follower is to start at $\emptyset_S = 0^0$ and is to have a range of 90°. Take three accuracy points at $x = 1, 3$ and 5.
4. The turning moment diagram for a multicylinder engine has been drawn to a scale 1mm = 600 N-m vertically and 1mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows:

   + 52, – 124, + 92, – 140, + 85, – 72 and + 107 mm^2, when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessary mass of the flywheel of radius 0.5 m.



5. The Turning Moment Diagram (TMD) of a single cylinder double acting engine consists of 2 isosceles triangles. The maximum TM are 2000Nm and 1500Nm respectively. When the engine works against a uniform resistance at a mean speed of 240rpm, find,

   i) Power

   ii) Maximum fluctuation of energy

   iii) Mass of flywheel. Radius of gyration =0.75m and the fluctuation of speed is limited to ±1% of mean speed

6. Single cylinder reciprocating engine has speed 240 r.p.m., stroke 300 mm, mass of reciprocating parts 50 kg, mass of revolving parts at 150 mm radius 37 kg. If two third of the reciprocating parts and all the revolving parts are to be balanced, find : (i) The balance mass required at a radius of 400 mm, and (ii) The residual unbalanced force when the crank has rotated 60° from top dead centre.
7. The arms of a porter governor are each 250mm long and pivoted on the governor axis. The mass of each ball is 5kg and the mass of the central sleeve is 30 kg. The radius of rotation of the ball is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20N of load at the sleeve, determine how the speed range is modified.
8. A spring loaded governor of the Hartnell type has arms of equal length. The masses rotate in a circle of 130 mm diameter when the sleeve is in the mid position and the ball arms are vertical. The equilibrium speed for this position is 450 r.p.m., neglecting friction. The maximum sleeve movement is to be 25 mm and the maximum variation of speed taking in account the friction to be 5 per cent of the mid position speed. The mass of the sleeve is 4 kg and the friction may be considered equivalent to 30 N at the sleeve. The power of the governor must be sufficient to overcome the friction by one per cent change of speed either way at mid-position. Determine, neglecting obliquity effect of arms ; (i). The value of each rotating mass : (ii). The spring stiffness in N/mm ; and (iii). The initial compression of spring.

Code No.: **50313** | **MR15**

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: **THERMAL ENGINEERING-I**

Branch: **ME**

Time: 3 hours **Max. Marks: 60**

PART – A

Answer ALL questions of the following **5x2M=10 M**

1. Why the inlet valve is opened before TDC and closed after BDC? Explain the salient features.
2. What is ignition lag in S.I. Engine combustion? Explain.
3. What is the use of heat balance sheet of an engine? Mention the various items to be determined to complete the heat balance sheet.
4. Explain the working principle of Roots blower.
5. What are different losses occurring in the centrifugal compressor due to different blade shapes? Explain.

PART-B

Answer any FIVE questions of the following **5x10 M= 50M**

1. Briefly Explain about "Air cooling" system with a neat sketch.
2. a) Write short notes on Assumptions of Air Standard cycle?
   b) Write short notes on Functions of Lubricating system.
3. Explain about effect of variabels on Ignition Lag.
4. Explain about different types of combustion chambers in S.I engines.
5. A Four cylinder four stroke petrol engine of 6.35 cm bore and 8.9 cm stroke was tested at full throttle and constant speed. The fuel supply was fixed at 0.064 kg/min and the plugs of the cylinders were short circuited without change of speed, the brake torque being correspondingly adjusted, The power measurements were as follows:

   With all cylinders = 12.3 KW
   With Cylinder No. 1 cutout = 8.9 KW
   With Cylinder No. 2 cutout = 8.8 KW
   With Cylinder No. 3 cutout = 8.7 KW
   With Cylinder No. 4 cutout = 8.6 KW

   Estimate the indicated power of the engine under these conditions. Find indicated thermal efficiency of the engine if the calorific value of fuel used is 43680 KJ/Kg. Compare this efficiency with the air standard value, if clearance volume of one cylinder is 70.3 cm^3.

6. A double acting air compressor of 50 KW in which air is drawn at 1 bar ,50° c and compressed according to the law $PV^{1.2} = C$ to 6 bar. The compressor runs at 150 rpm with an average piston speed of 175 m/min. neglecting clearance. Find the sizes of the cylinder.

7. a) Derive an expression for Workdone in single stage compressor with clearance volume.
   b) Write short notes on Difference between Perfect cooling and imperfect cooling of multistage air compressor.
8. a) Write short notes on Axial Flow compressors with neat diagram
   b) What are different parameters influence the performance of the centrifugal compressors? Explain.

Code No.: **50314** **MR15**

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: **PRODUCTION TECHNOLOGY**

Branch: **ME**

Time: 3 hours **Max. Marks: 60**

PART – A

Answer ALL questions of the following **5x2M=10 M**

1. What is directional solidification? Why it is required.
2. List out the types of weld joints with neat sketches.
3. Differentiate drawing and cup Drawing?
4. What is the difference between forward extrusion and backward extrusion?
5. What are the methods for production of plastics?

PART-B

Answer any FIVE questions of the following **5x10 M= 50M**

1. a) Explain Centrifugal casting process with a neat sketch.
   b) Enumerate some common casting defects.
2. W hat are the various ways of melting steel? Explain any one in detail.
3. Define soldering process. Explain the types of soldering process with neat sketches.
4. a) Explain the melting zones in cupola furnace with chemical reactions involved in it.
   b) Explain laser welding with neat sketch.
5. a) Write short notes on Cold spinning
   b) Classify mechanical presses. Explain flypress with neat sketch.
6. a) What are the advantages and limitations of hot working and cold working processes.
   b) Explain the various types of bending operations.
7. With a neat sketch explain open die forging and closed die forging.
8. Define condensation polymerization which plastics make use of these processes? Explain.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: **FLUID MECHANICS AND HYDRAULIC MACHINES**

Branch: **ME**

Time: 3 hours **Max. Marks: 60**

PART – A

Answer ALL questions of the following **5x2M=10 M**

1. Explain the phenomena of surface tension.
2. Define Stream line, streak line, path line when do they coincide
3. List out the minor losses in pipes with expressions.
4. Define Impulse reaction turbine principle
5. Define slip and negative slip of a reciprocating pump?

PART-B

Answer any FIVE questions of the following **5x10 M= 50M**

1. a) The kinematic viscosity & sp.gravity of a certain liquids are 5.58×10^{-4} m^2/s & 2 respectively. Calculate viscosity of liquid in S.I units.

   b) An open tank contains water up to a depth of 1.5 m and above it an oil of sp.gr.0.8 for a depth of 2 m. Find the pressure intensity at the interface of the two liquids and bottom of the tank.
2. a) Differentiate between kinematic and dynamic viscosity.

   b) Two horizontal plates are placed at 10.5 mm apart the space between plates is filled with oil of viscosity 12 poise. Calculate the shear stress of oil when upper plate is moved with a velocity of 2.4 m/s.
3. a) State the assumptions and derive an expression for Bernolli's theorem from first principle. **[6M]**

   b) A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s. **[4M]**
4. a) Explain flow nozzle.

   b) Discuss the relative merits and demerits of venture meter with respect to orifice meter.
5. a) Explain Reynolds's experiment with neat sketch. What is its significance in pipe flow?

   b) A pipe through which water is flowing is having diameter 20 & 10cms at cross sections (1) & (2) respectively. The velocity of water at section (1) is 4M/s. Find velocity head at section (1) & (2) and also rate of flow.

6. a)Explain the different types of the efficiencies of turbine

   b) Explain i) Unit speed ii) Unit discharge iii) Unit power.

7. a) A 150mm diameter pipe reduces in diameter abruptly to 100mm diameter. If the pipe carries water at 30 lit/sec, then calculate the pressure loss across the contraction. Take coefficient of contraction as 0.6.

   b) Explain the Governing of Hydraulic Turbines with a neat sketch.

8. a) Explain the working principle of a Centrifugal Pump with a neat sketch.

   b) A single acting reciprocating pump operating at 120rpm has a piston diameter of 200mm and stroke of 300mm. The suction and delivery heads are 4m and 20m respectively. If the efficiency of both suction and delivery strokes is 75%, then determine the power required by the pump.