SLR-TX – 10

Seat No.	

Set **P**

F.E. (Part – I) (CGPA Pattern) Examination, 2018
BASIC MECHANICAL ENGINEERING (Old)

Day and Date : Monday, 10-12-2018 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **Neat** diagrams must be drawn **whenever** necessary.*
*4) Make suitable assumptions, **if necessary** and mention it **clearly**.*
*5) Figures to the **right** indicate **full** marks.*
*6) Q. No. **2** and Q. No. **4** are short answer type question.*
*7) Q. **3** and Q. **5** are long answer type question.*
*8) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) In split air conditioning
   a) All components are kept in compact box
   b) Compressor and condenser are placed outside the room
   c) Compressor and condenser are placed inside the room
   d) Evaporator is placed outside the room

2) PMM-1 of first kind is impossible according to
   a) 1st Law of Thermodynamics b) 2nd Law of Thermodynamics
   c) 3rd Law of Thermodynamics d) Zeroth Law of Thermodynamics

3) Otto cycle is known as
   a) Constant volume cycle b) Constant pressure cycle
   c) Constant temperature cycle d) None of the above

4) A compressor is used
   a) Gas turbine power plant
   b) For starting and supercharging I.C. Engine
   c) Pneumatic drill
   d) All of above

P.T.O.

5) Coal is used as fuel in
   a) Hydroelectric power plant b) Nuclear power plant
   c) Steam power plant d) All of these

6) In two stroke engine one power stroke is obtained in
   a) One revolution of crankshaft b) Two revolution of crankshaft
   c) Four revolution of crankshaft d) Half revolution of crankshaft

7) Enhancing the beauty and symmetry of product is taken in following design
   a) Ergonomics consideration b) Aesthetic consideration
   c) Refrigeration d) Air conditioning

8) A hole can be cut in a component by
   a) Drilling machine b) Lathe machine
   c) Both of these d) None of these

9) The draft tube is used
   a) To increase pressure energy of water
   b) To decrease pressure energy of water
   c) To increase kinetic energy of water
   d) None

10) Method of joining two work piece made of two dissimilar materials above 450°C is called
   a) Riveting b) Brazing c) Soldering d) None

11) The property of material which enables it to be drawn into wires is called
   a) Toughness b) Malleability c) Brittleness d) Ductility

12) Slip and Creep is associated with
   a) Belts b) Couplings c) Gears d) Chains

13) An element which connects the piston of an engine with crank is
   a) Connecting rod b) Piston rod
   c) Crank rod d) Crank case

14) The function of nozzle is to convert the pressure energy into
   a) Kinetic energy b) Steam energy
   c) Potential energy d) Heat energy

Seat No.	

F.E. (Part – I) (CGPA Pattern) Examination, 2018
BASIC MECHANICAL ENGINEERING (Old)

Day and Date : Monday, 10-12-2018 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **Neat** diagrams must be drawn **whenever** necessary.*
*2) Make suitable assumptions, **if necessary** and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Q. No. **2** and Q. No. **4** are short answer type question.*
*5) Q. **3** and Q. **5** are long answer type question.*
*6) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

SECTION – I

2. Answer **any five** of the following seven : **(5×3=15)**
   a) Explain types of thermodynamic systems and give one example of each.
   b) State and explain second law of thermodynamics.
   c) Derive an expression of work done for adiabatic process.
   d) Draw neat sketch of split air conditioner. How it differ from window air conditioner ?
   e) State the function of following units in Hydro power plant -
      1) Penstock
      2) Reservoir
      3) Nozzle
   f) Compare BWR and PWR.
   g) Explain in brief working of single acting reciprocating pump.

3. Answer **any three** of the following : **13**
   a) Explain with neat sketch the working of Steam power plant. State its advantages and disadvantages. **5**
   b) A nozzle is used for increasing the velocity of steam. The enthalpy and velocity of steam entering the nozzle are 3000 kJ/kg and 60 m/s respectively. The enthalpy at the exit of the nozzle 2800 kJ/kg. Inlet area is 0.12 m^2,

specific volume at inlet is 0.2 m^3/kg and specific volume at outlet is 0.5 m^3/kg. The heat losses from horizontal nozzle are negligible. Find

i) Velocity and the area at the exit from the nozzle

ii) Mass flow rate. **4**

c) What is Hydraulic Impulse Turbine ? Explain the working of Pelton wheel. **4**

d) 0.8 kg air is compressed adiabatically from 200 KPa pressure and 70° C temperature to 0.9 MPa pressure. It is then expanded at constant pressure to reach its original volume. Find gross heat transfer and gross work transfer. Assume C_p = 1.005 and C_v= 0.718 kJ/kg ^{0}K. **4**

e) A closed system undergoes a thermodynamic cycle consisting of 5 processes. The following data gives the work and heat transfer for each of the process.

Proceee	Heat transfer in kJ/min	Work transfer in kJ/min
1 – 2	Nil	– 8000
2 – 3	6000	Nil
3 – 4	2000	4000
4 – 5	Nil	8000
5 – 1	– 4000	Nil

Show that the data is consistent with First law of thermodynamics and determine

i) Net rate of work output.

ii) Efficiency of cycle.

iii) Change in internal energy for cycle. **4**

SECTION – II

4. Answer **any five** of the following seven : **(5×3=15)**

a) Compare two stroke engine and four stroke engine.

b) A Diesel engine has a compression ratio of 18 and cut off takes place at 5% of the stroke, calculate air standard efficiency. Take γ = 1.4.

c) Write a short note on chain drives giving its advantages and disadvantages.

d) Write a short note on gas welding.

e) What are different steps involved in design process ?

f) Differentiate between Brazing and Soldering.

g) Define the terms – ductility, malleability, hardness.

Set P

5. Answer **any three** of the following four : **13**

a) Following data refers to an open belt drive :

Distance between two parallel shaft	= 4 m
Diameter of Pulley (larger)	= 1.5 m
Diameter of smaller Pulley	= 1 m
Initial tension in belt	= 2.8 kN
Mass of belt material	= 1.4 kg/m
Co-efficient of friction between the belt and pulley	= 0.3
Speed of smaller Pulley	= 400 rpm

Calculate power transmitted. **5**

b) Draw block diagram of pillar drilling machine and explain functions of basic elements. **4**

c) An engine working on an Otto has a compression ratio of 8. The compression begins at 100 KPa and 15° C . The heat supplied per cycle is 1800 kJ/kg of air.

Determine :

i) Thermal Efficiency

ii) Maximum cycle temperature. **4**

d) Explain Aesthetic considerations in design. **4**

SLR-TX – 10

Seat No.	

Set **Q**

F.E. (Part – I) (CGPA Pattern) Examination, 2018
BASIC MECHANICAL ENGINEERING (Old)

Day and Date : Monday, 10-12-2018 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **Neat** diagrams must be drawn **whenever** necessary.*
*4) Make suitable assumptions, **if necessary** and mention it **clearly**.*
*5) Figures to the **right** indicate **full** marks.*
*6) Q. No. **2** and Q. No. **4** are short answer type question.*
*7) Q. **3** and Q. **5** are long answer type question.*
*8) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) A hole can be cut in a component by
   a) Drilling machine b) Lathe machine
   c) Both of these d) None of these

2) The draft tube is used
   a) To increase pressure energy of water
   b) To decrease pressure energy of water
   c) To increase kinetic energy of water
   d) None

3) Method of joining two work piece made of two dissimilar materials above 450°C is called
   a) Riveting b) Brazing c) Soldering d) None

4) The property of material which enables it to be drawn into wires is called
   a) Toughness b) Malleability c) Brittleness d) Ductility

5) Slip and Creep is associated with
   a) Belts b) Couplings c) Gears d) Chains

P.T.O.

6) An element which connects the piston of an engine with crank is
   a) Connecting rod b) Piston rod
   c) Crank rod d) Crank case

7) The function of nozzle is to convert the pressure energy into
   a) Kinetic energy b) Steam energy
   c) Potential energy d) Heat energy

8) In split air conditioning
   a) All components are kept in compact box
   b) Compressor and condenser are placed outside the room
   c) Compressor and condenser are placed inside the room
   d) Evaporator is placed outside the room

9) PMM-1 of first kind is impossible according to
   a) 1st Law of Thermodynamics b) 2nd Law of Thermodynamics
   c) 3rd Law of Thermodynamics d) Zeroth Law of Thermodynamics

10) Otto cycle is known as
   a) Constant volume cycle b) Constant pressure cycle
   c) Constant temperature cycle d) None of the above

11) A compressor is used
   a) Gas turbine power plant
   b) For starting and supercharging I.C. Engine
   c) Pneumatic drill
   d) All of above

12) Coal is used as fuel in
   a) Hydroelectric power plant b) Nuclear power plant
   c) Steam power plant d) All of these

13) In two stroke engine one power stroke is obtained in
   a) One revolution of crankshaft b) Two revolution of crankshaft
   c) Four revolution of crankshaft d) Half revolution of crankshaft

14) Enhancing the beauty and symmetry of product is taken in following design
   a) Ergonomics consideration b) Aesthetic consideration
   c) Refrigeration d) Air conditioning

_____

SLR-TX – 10

Seat No.	

F.E. (Part – I) (CGPA Pattern) Examination, 2018
BASIC MECHANICAL ENGINEERING (Old)

Day and Date : Monday, 10-12-2018 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **Neat** diagrams must be drawn **whenever** necessary.*
*2) Make suitable assumptions, **if necessary** and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Q. No. **2** and Q. No. **4** are short answer type question.*
*5) Q. **3** and Q. **5** are long answer type question.*
*6) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

SECTION – I

2. Answer **any five** of the following seven : **(5×3=15)**
   a) Explain types of thermodynamic systems and give one example of each.
   b) State and explain second law of thermodynamics.
   c) Derive an expression of work done for adiabatic process.
   d) Draw neat sketch of split air conditioner. How it differ from window air conditioner ?
   e) State the function of following units in Hydro power plant -
      1) Penstock
      2) Reservoir
      3) Nozzle
   f) Compare BWR and PWR.
   g) Explain in brief working of single acting reciprocating pump.

3. Answer **any three** of the following : **13**
   a) Explain with neat sketch the working of Steam power plant. State its advantages and disadvantages. **5**
   b) A nozzle is used for increasing the velocity of steam. The enthalpy and velocity of steam entering the nozzle are 3000 kJ/kg and 60 m/s respectively. The enthalpy at the exit of the nozzle 2800 kJ/kg. Inlet area is 0.12 m^2,

specific volume at inlet is 0.2 m^3/kg and specific volume at outlet is 0.5 m^3/kg. The heat losses from horizontal nozzle are negligible. Find

i) Velocity and the area at the exit from the nozzle

ii) Mass flow rate. **4**

c) What is Hydraulic Impulse Turbine ? Explain the working of Pelton wheel. **4**

d) 0.8 kg air is compressed adiabatically from 200 KPa pressure and 70° C temperature to 0.9 MPa pressure. It is then expanded at constant pressure to reach its original volume. Find gross heat transfer and gross work transfer. Assume C_p = 1.005 and C_v= 0.718 kJ/kg ^{0}K. **4**

e) A closed system undergoes a thermodynamic cycle consisting of 5 processes. The following data gives the work and heat transfer for each of the process.

Proceee	Heat transfer in kJ/min	Work transfer in kJ/min
1 – 2	Nil	– 8000
2 – 3	6000	Nil
3 – 4	2000	4000
4 – 5	Nil	8000
5 – 1	– 4000	Nil

Show that the data is consistent with First law of thermodynamics and determine

i) Net rate of work output.

ii) Efficiency of cycle.

iii) Change in internal energy for cycle. **4**

SECTION – II

4. Answer **any five** of the following seven : **(5×3=15)**

a) Compare two stroke engine and four stroke engine.

b) A Diesel engine has a compression ratio of 18 and cut off takes place at 5% of the stroke, calculate air standard efficiency. Take γ = 1.4.

c) Write a short note on chain drives giving its advantages and disadvantages.

d) Write a short note on gas welding.

e) What are different steps involved in design process ?

f) Differentiate between Brazing and Soldering.

g) Define the terms – ductility, malleability, hardness.

Set Q

5. Answer **any three** of the following four : **13**

a) Following data refers to an open belt drive :

Distance between two parallel shaft	= 4 m
Diameter of Pulley (larger)	= 1.5 m
Diameter of smaller Pulley	= 1 m
Initial tension in belt	= 2.8 kN
Mass of belt material	= 1.4 kg/m
Co-efficient of friction between the belt and pulley	= 0.3
Speed of smaller Pulley	= 400 rpm

Calculate power transmitted. **5**

b) Draw block diagram of pillar drilling machine and explain functions of basic elements. **4**

c) An engine working on an Otto has a compression ratio of 8. The compression begins at 100 KPa and 15° C . The heat supplied per cycle is 1800 kJ/kg of air.

Determine :

i) Thermal Efficiency

ii) Maximum cycle temperature. **4**

d) Explain Aesthetic considerations in design. **4**

Set Q

SLR-TX – 10

Seat No.	

Set R

F.E. (Part – I) (CGPA Pattern) Examination, 2018
BASIC MECHANICAL ENGINEERING (Old)

Day and Date : Monday, 10-12-2018 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **Neat** diagrams must be drawn **whenever** necessary.*
*4) Make suitable assumptions, **if necessary** and mention it **clearly**.*
*5) Figures to the **right** indicate **full** marks.*
*6) Q. No. **2** and Q. No. **4** are short answer type question.*
*7) Q. **3** and Q. **5** are long answer type question.*
*8) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Coal is used as fuel in
   a) Hydroelectric power plant b) Nuclear power plant
   c) Steam power plant d) All of these

2) In two stroke engine one power stroke is obtained in
   a) One revolution of crankshaft
   b) Two revolution of crankshaft
   c) Four revolution of crankshaft
   d) Half revolution of crankshaft

3) Enhancing the beauty and symmetry of product is taken in following design
   a) Ergonomics consideration b) Aesthetic consideration
   c) Refrigeration d) Air conditioning

4) A hole can be cut in a component by
   a) Drilling machine b) Lathe machine
   c) Both of these d) None of these

P.T.O.

5) The draft tube is used
   a) To increase pressure energy of water
   b) To decrease pressure energy of water
   c) To increase kinetic energy of water
   d) None

6) Method of joining two work piece made of two dissimilar materials above 450°C is called
   a) Riveting b) Brazing c) Soldering d) None

7) The property of material which enables it to be drawn into wires is called
   a) Toughness b) Malleability c) Brittleness d) Ductility

8) Slip and Creep is associated with
   a) Belts b) Couplings c) Gears d) Chains

9) An element which connects the piston of an engine with crank is
   a) Connecting rod b) Piston rod
   c) Crank rod d) Crank case

10) The function of nozzle is to convert the pressure energy into
   a) Kinetic energy b) Steam energy
   c) Potential energy d) Heat energy

11) In split air conditioning
   a) All components are kept in compact box
   b) Compressor and condenser are placed outside the room
   c) Compressor and condenser are placed inside the room
   d) Evaporator is placed outside the room

12) PMM-1 of first kind is impossible according to
   a) 1st Law of Thermodynamics b) 2nd Law of Thermodynamics
   c) 3rd Law of Thermodynamics d) Zeroth Law of Thermodynamics

13) Otto cycle is known as
   a) Constant volume cycle b) Constant pressure cycle
   c) Constant temperature cycle d) None of the above

14) A compressor is used
   a) Gas turbine power plant
   b) For starting and supercharging I.C. Engine
   c) Pneumatic drill
   d) All of above

SLR-TX – 10

Seat No.	

F.E. (Part – I) (CGPA Pattern) Examination, 2018
BASIC MECHANICAL ENGINEERING (Old)

Day and Date : Monday, 10-12-2018 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **Neat** diagrams must be drawn **whenever** necessary.*
*2) Make suitable assumptions, **if necessary** and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Q. No. **2** and Q. No. **4** are short answer type question.*
*5) Q. **3** and Q. **5** are long answer type question.*
*6) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

SECTION – I

2. Answer **any five** of the following seven : **(5×3=15)**
   a) Explain types of thermodynamic systems and give one example of each.
   b) State and explain second law of thermodynamics.
   c) Derive an expression of work done for adiabatic process.
   d) Draw neat sketch of split air conditioner. How it differ from window air conditioner ?
   e) State the function of following units in Hydro power plant -
      1) Penstock
      2) Reservoir
      3) Nozzle
   f) Compare BWR and PWR.
   g) Explain in brief working of single acting reciprocating pump.

3. Answer **any three** of the following : **13**
   a) Explain with neat sketch the working of Steam power plant. State its advantages and disadvantages. **5**
   b) A nozzle is used for increasing the velocity of steam. The enthalpy and velocity of steam entering the nozzle are 3000 kJ/kg and 60 m/s respectively. The enthalpy at the exit of the nozzle 2800 kJ/kg. Inlet area is 0.12 m^2,

specific volume at inlet is 0.2 m^3/kg and specific volume at outlet is 0.5 m^3/kg. The heat losses from horizontal nozzle are negligible. Find

i) Velocity and the area at the exit from the nozzle

ii) Mass flow rate. **4**

c) What is Hydraulic Impulse Turbine ? Explain the working of Pelton wheel. **4**

d) 0.8 kg air is compressed adiabatically from 200 KPa pressure and 70° C temperature to 0.9 MPa pressure. It is then expanded at constant pressure to reach its original volume. Find gross heat transfer and gross work transfer. Assume C_p = 1.005 and C_v= 0.718 kJ/kg ^{0}K. **4**

e) A closed system undergoes a thermodynamic cycle consisting of 5 processes. The following data gives the work and heat transfer for each of the process.

Proceee	Heat transfer in kJ/min	Work transfer in kJ/min
1 – 2	Nil	– 8000
2 – 3	6000	Nil
3 – 4	2000	4000
4 – 5	Nil	8000
5 – 1	– 4000	Nil

Show that the data is consistent with First law of thermodynamics and determine

i) Net rate of work output.

ii) Efficiency of cycle.

iii) Change in internal energy for cycle. **4**

SECTION – II

4. Answer **any five** of the following seven : **(5×3=15)**

a) Compare two stroke engine and four stroke engine.

b) A Diesel engine has a compression ratio of 18 and cut off takes place at 5% of the stroke, calculate air standard efficiency. Take γ = 1.4.

c) Write a short note on chain drives giving its advantages and disadvantages.

d) Write a short note on gas welding.

e) What are different steps involved in design process ?

f) Differentiate between Brazing and Soldering.

g) Define the terms – ductility, malleability, hardness.

5. Answer **any three** of the following four : **13**

a) Following data refers to an open belt drive :

Distance between two parallel shaft	= 4 m
Diameter of Pulley (larger)	= 1.5 m
Diameter of smaller Pulley	= 1 m
Initial tension in belt	= 2.8 kN
Mass of belt material	= 1.4 kg/m
Co-efficient of friction between the belt and pulley	= 0.3
Speed of smaller Pulley	= 400 rpm

Calculate power transmitted. **5**

b) Draw block diagram of pillar drilling machine and explain functions of basic elements. **4**

c) An engine working on an Otto has a compression ratio of 8. The compression begins at 100 KPa and 15° C . The heat supplied per cycle is 1800 kJ/kg of air.

Determine :

i) Thermal Efficiency

ii) Maximum cycle temperature. **4**

d) Explain Aesthetic considerations in design. **4**

SLR-TX – 10

Seat No.	

Set S

F.E. (Part – I) (CGPA Pattern) Examination, 2018
BASIC MECHANICAL ENGINEERING (Old)

Day and Date : Monday, 10-12-2018 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **Neat** diagrams must be drawn **whenever** necessary.*
*4) Make suitable assumptions, **if necessary** and mention it **clearly**.*
*5) Figures to the **right** indicate **full** marks.*
*6) Q. No. **2** and Q. No. **4** are short answer type question.*
*7) Q. **3** and Q. **5** are long answer type question.*
*8) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Method of joining two work piece made of two dissimilar materials above 450°C is called
a) Riveting b) Brazing c) Soldering d) None

2) The property of material which enables it to be drawn into wires is called
a) Toughness b) Malleability
c) Brittleness d) Ductility

3) Slip and Creep is associated with
a) Belts b) Couplings c) Gears d) Chains

4) An element which connects the piston of an engine with crank is
a) Connecting rod b) Piston rod
c) Crank rod d) Crank case

5) The function of nozzle is to convert the pressure energy into
a) Kinetic energy b) Steam energy
c) Potential energy d) Heat energy

P.T.O.

6) In split air conditioning
   a) All components are kept in compact box
   b) Compressor and condenser are placed outside the room
   c) Compressor and condenser are placed inside the room
   d) Evaporator is placed outside the room

7) PMM-1 of first kind is impossible according to
   a) 1st Law of Thermodynamics
   b) 2nd Law of Thermodynamics
   c) 3rd Law of Thermodynamics
   d) Zeroth Law of Thermodynamics

8) Otto cycle is known as
   a) Constant volume cycle
   b) Constant pressure cycle
   c) Constant temperature cycle
   d) None of the above

9) A compressor is used
   a) Gas turbine power plant
   b) For starting and supercharging I.C. Engine
   c) Pneumatic drill
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10) Coal is used as fuel in
   a) Hydroelectric power plant
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11) In two stroke engine one power stroke is obtained in
   a) One revolution of crankshaft
   b) Two revolution of crankshaft
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12) Enhancing the beauty and symmetry of product is taken in following design
   a) Ergonomics consideration
   b) Aesthetic consideration
   c) Refrigeration
   d) Air conditioning

13) A hole can be cut in a component by
   a) Drilling machine
   b) Lathe machine
   c) Both of these
   d) None of these

14) The draft tube is used
   a) To increase pressure energy of water
   b) To decrease pressure energy of water
   c) To increase kinetic energy of water
   d) None

_____

SLR-TX – 10

Seat No.	

F.E. (Part – I) (CGPA Pattern) Examination, 2018
BASIC MECHANICAL ENGINEERING (Old)

Day and Date : Monday, 10-12-2018 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **Neat** diagrams must be drawn **whenever** necessary.*
*2) Make suitable assumptions, **if necessary** and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Q. No. **2** and Q. No. **4** are short answer type question.*
*5) Q. **3** and Q. **5** are long answer type question.*
*6) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

SECTION – I

2. Answer **any five** of the following seven : **(5×3=15)**
   a) Explain types of thermodynamic systems and give one example of each.
   b) State and explain second law of thermodynamics.
   c) Derive an expression of work done for adiabatic process.
   d) Draw neat sketch of split air conditioner. How it differ from window air conditioner ?
   e) State the function of following units in Hydro power plant -
      1) Penstock
      2) Reservoir
      3) Nozzle
   f) Compare BWR and PWR.
   g) Explain in brief working of single acting reciprocating pump.

3. Answer **any three** of the following : **13**
   a) Explain with neat sketch the working of Steam power plant. State its advantages and disadvantages. **5**
   b) A nozzle is used for increasing the velocity of steam. The enthalpy and velocity of steam entering the nozzle are 3000 kJ/kg and 60 m/s respectively. The enthalpy at the exit of the nozzle 2800 kJ/kg. Inlet area is 0.12 m^2,

specific volume at inlet is 0.2 m^3/kg and specific volume at outlet is 0.5 m^3/kg. The heat losses from horizontal nozzle are negligible. Find

i) Velocity and the area at the exit from the nozzle

ii) Mass flow rate. **4**

c) What is Hydraulic Impulse Turbine ? Explain the working of Pelton wheel. **4**

d) 0.8 kg air is compressed adiabatically from 200 KPa pressure and 70° C temperature to 0.9 MPa pressure. It is then expanded at constant pressure to reach its original volume. Find gross heat transfer and gross work transfer. Assume C_p = 1.005 and C_v= 0.718 kJ/kg ^{0}K. **4**

e) A closed system undergoes a thermodynamic cycle consisting of 5 processes. The following data gives the work and heat transfer for each of the process.

Proceee	Heat transfer in kJ/min	Work transfer in kJ/min
1 – 2	Nil	– 8000
2 – 3	6000	Nil
3 – 4	2000	4000
4 – 5	Nil	8000
5 – 1	– 4000	Nil

Show that the data is consistent with First law of thermodynamics and determine

i) Net rate of work output.

ii) Efficiency of cycle.

iii) Change in internal energy for cycle. **4**

SECTION – II

4. Answer **any five** of the following seven : **(5×3=15)**

a) Compare two stroke engine and four stroke engine.

b) A Diesel engine has a compression ratio of 18 and cut off takes place at 5% of the stroke, calculate air standard efficiency. Take γ = 1.4.

c) Write a short note on chain drives giving its advantages and disadvantages.

d) Write a short note on gas welding.

e) What are different steps involved in design process ?

f) Differentiate between Brazing and Soldering.

g) Define the terms – ductility, malleability, hardness.

Set S

5. Answer **any three** of the following four : **13**

a) Following data refers to an open belt drive :

Distance between two parallel shaft	= 4 m
Diameter of Pulley (larger)	= 1.5 m
Diameter of smaller Pulley	= 1 m
Initial tension in belt	= 2.8 kN
Mass of belt material	= 1.4 kg/m
Co-efficient of friction between the belt and pulley	= 0.3
Speed of smaller Pulley	= 400 rpm

Calculate power transmitted. **5**

b) Draw block diagram of pillar drilling machine and explain functions of basic elements. **4**

c) An engine working on an Otto has a compression ratio of 8. The compression begins at 100 KPa and 15° C . The heat supplied per cycle is 1800 kJ/kg of air.

Determine :

i) Thermal Efficiency

ii) Maximum cycle temperature. **4**

d) Explain Aesthetic considerations in design. **4**
