Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **M.Tech**
P2NTBC12

2nd Semester Back Examination 2018-19
NANOTECHNOLOGY FOR ENERGY SYSTEM
BRANCH : NANO TECH.
Max Marks : 100
Time : 3 Hours
Q.CODE : F574

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1 Only Short Answer Type Questions (Answer All-10) **(2 x 10)**

a) Sustainable energy and renewable energy are similar. State true or false and support your answer.
b) Can coal and natural gas be considered sources of sustainable energy? Give reason to your answer.
c) List (only) the classification for display technologies.
d) Provide a brief introduction to microfluidics. Where are they used?
e) Briefly introduce “carbon cycle”.
f) How are LEDs different from OLEDs?
g) What is QLED? Which type of nanomaterial is used here?
h) Define the term “hydrogen storage capacity”.
i) What is an electromechanical system?
j) What are the conditions (pressure and temperature) under which hydrogen is stored?

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) **(6 x 8)**

a) Write down a list of various renewable energy sources and briefly introduce each. Also justify why each source of energy can be called “renewable”.
b) Compare nano and micro electromechanical systems (NEMS/MEMS).
c) Distinguish between liquid and compressed hydrogen.
d) Explain in detail on the use of nanotechnology in modern day display.
e) What are the economic benefits of the use of nanotechnology in energy storage and transport energy?
f) What are the challenges to hydrogen storage? Make a list of applications of hydrogen storage and/or transport.
g) “An easy solution to the energy challenge is difficult as of now”- Give proper justification to this statement.
h) Discuss in detail the development of supercapacitors by nanomaterials design.
i) Explain in detail the “piezoelectric” nano generator, including the mechanism of operation and the nanomaterials used.
j) Discuss in detail “thin film energy storage”. What are the merits and demerits of the same?
k) What are microchannel batteries? Explain with the help of a schematic diagram. What are the advantages of a microchannelbattry?
l) Elaborate on microfluidicthermocapillary pumping system, with the help of suitable illustrations.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 What do you understand by the term “solar light harvesting”? Elaborate on the various steps of solar light harvesting. **(16)**

Q4 What is nanocatalysis? Which materials are used as nanocatalysts? Discuss the advantages of nanocatalysis. **(16)**

Q5 Make a comparison between traditional means of hydrogen storage and hydrogen storage via use of nanotechnology. What are the advantages and challenges of using nanostructured materials for hydrogen storage? **(16)**

Q6 What are micro-fuel cells? Discuss in detail the integration and performance of micro-fuel cell technologies. **(16)**